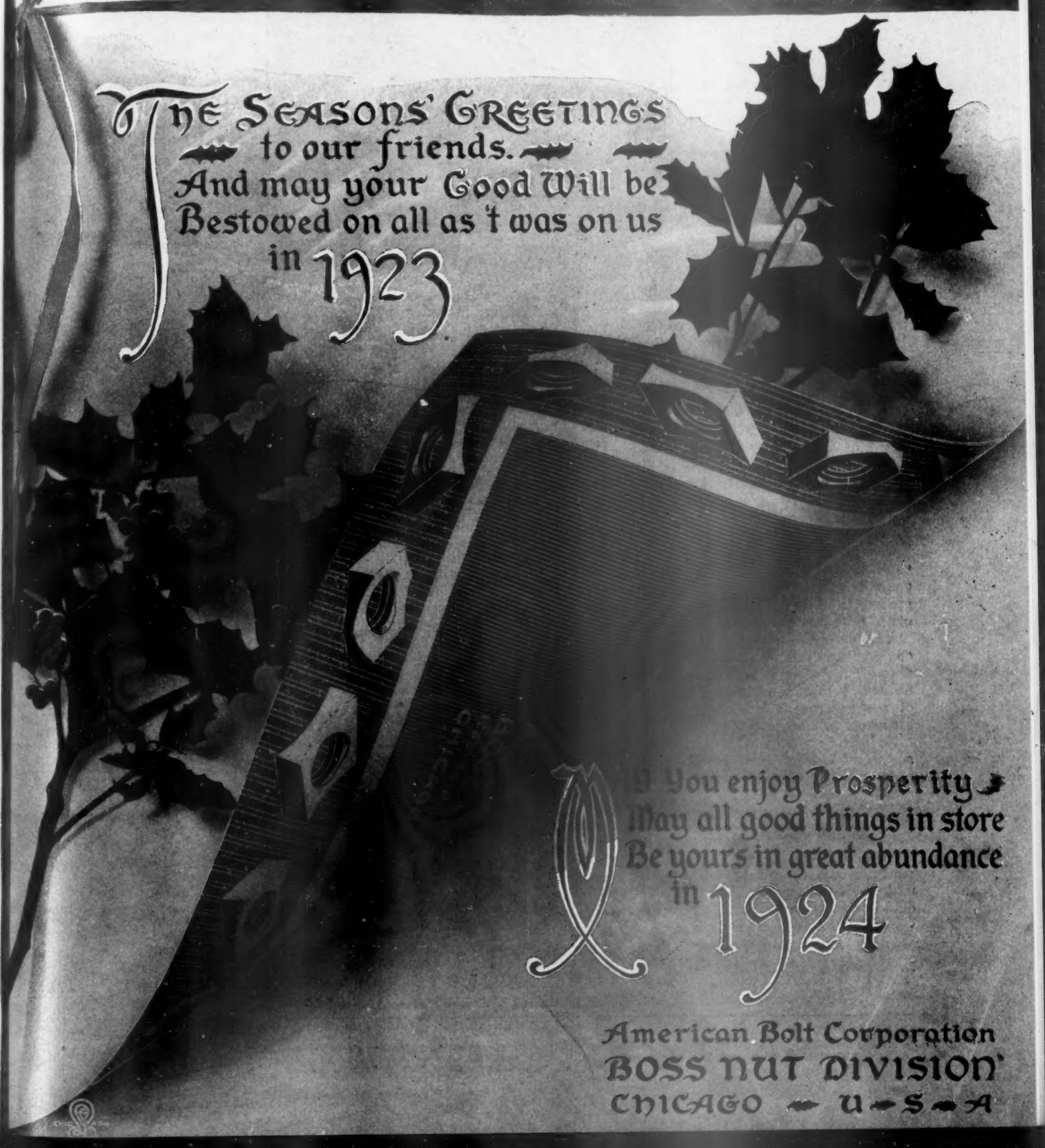
DEC 26 1923

PER... GENER... UNIV. OF M...

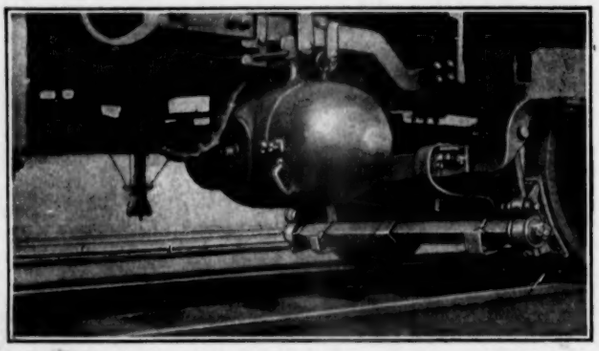
Railway Age

SECOND HALF OF 1923—No. 25 NEW YORK—DECEMBER 22, 1923—CHICAGO SIXTY-EIGHTH YEAR


The Seasons' Greetings
to our friends.
And may your Good Will be
Bestowed on all as 't was on us
in 1923
May you enjoy Prosperity
May all good things in store
Be yours in great abundance
in 1924
American Bolt Corporation
BOSS NUT DIVISION
CHICAGO — U — S — A

This axle lighting equipment keeps batteries charged

Yet it avoids injurious overcharging



The Exide Equipment is the only one to operate on the principle which engineers everywhere now recognize as the correct one—constant voltage rather than constant current.

THE ideal way for an axle lighting equipment to charge a battery is to regulate the current it delivers according to the current actually needed by the battery. That is exactly what the Exide Axle Lighting Equipment does.

Its output is not regulated in two or three large steps, inaccurately approximating the battery's true needs. The current delivered by the generator is always equal to the lamp-load plus the battery requirement. This is true for any current required by lamps and battery combined, from a trickle-charge condition up to the full overload capacity of the generator.

Increasing battery life and decreasing costs

Since with Exide equipments, batteries are neither undercharged nor overcharged, battery life is at least fifty per cent longer than with other systems. Along with increased battery life there also results a material decrease in operating cost.

Batteries need flushing no oftener than twice each year. This is because there is little water used in gassing, and little evaporation because cells never overheat.

The life of battery-containers and compartments is increased, for the absence of gassing means practically no acid spray, and the infrequency of flushing means less opportunity for water to spill.

Sediment is deposited very slowly, so that batteries need be cleaned only once during their life.

Getting rid of yard charges

Less yard charging is necessary with the Exide Axle Lighting Equipment. Batteries are kept charged under operating conditions which, except with the Exide Equipment, would involve regular yard charging.

Every car-lighting man knows the difficulty of keeping batteries charged on local runs with frequent stops and low average train speed.

Such runs are handled by the Exide Equipment without yard charging because the generator cuts in at a low rate of speed, and its full overload capacity is available, and used, for rapid charging when required.

No "sneak currents"

With the Exide Equipment, no current is consumed in lamp-regulator coils, or otherwise, when the car is not in motion. No current is drawn from the battery except for lights or similar useful purposes.

There are no "sneak currents" to drain the battery when cars stand idle, even though the main switch is left closed through oversight.

Lights do not flicker

Lamp flicker is often caused by lamp-regulator trouble. The Exide Axle Lighting Equipment, however, does not use a lamp regulator.

A still more frequent cause of lamp flicker is the use of an automatic switch which cuts in at a set voltage. This voltage is rarely the same as the battery voltage at the time the switch closes.

The Exide automatic switch differs from all others in that it is held open by a difference between battery and generator voltage, and closes only when battery and generator voltage are equal. Cutting in and cutting out are accomplished without the slightest flicker.

Extreme simplicity

An Exide Equipment does not require continual adjustment and detailed inspection. There is little on either the equipment or panel to go wrong—only two moving parts on the whole system. One is the generator armature and the other the automatic switch contacts.

There are *no dash pots, no lamp regulator, pole changer, levers or pivots, carbon piles, or vibrating contacts.* The equipment automatically adjusts itself to widely varying conditions of operation.

The whole system is amazingly simple, and this simplicity, of course, lowers maintenance and repair costs.

Fewer lamp failures

It also means fewer lamp failures, for when you simplify operation you lessen chances for trouble to develop. Under the use of Exide Axle Lighting Equipments lamp failures are rare occurrences.

Our Bulletin No. 186 describes the Exide Axle Lighting Equipment in detail. It contains much information that every car-lighting man will find of value. Send for a copy; it is free.

The best proof of the improvement in car lighting, and the reduction of expense that results from the use of Exide Axle Lighting Equipments, is to equip one or more cars on your road and compare results.

Exide

E.S.B.

AXLE LIGHTING SYSTEM

THE ELECTRIC STORAGE BATTERY COMPANY, PHILADELPHIA

Manufactured in Canada by Exide Batteries of Canada, Limited, 133-157 Dufferin Street, Toronto

Volume 75 **Number 25**

Published Weekly by Simmons-Boardman Pub. Co., 30 Church St., New York, N. Y. Subscription Price U. S., Canada and Mexico, $6.00; foreign countries (excepting daily editions), $8.00, and $10.00 a year including all dailies; single copies, 25c. Entered as second-class matter January 30, 1918, at the post office at New York, N. Y., under the act of March 3, 1879.

EDITORIAL

Railway Age

The Table of Contents Will Be Found on Page 5 of the Advertising Section

Engine Terminals Limit Net Income

Many engine terminals are totally unsuited for the rapid, economical handling of locomotives by reason of obsolete and inadequate terminal designs and the lack of modern equipment. This delays the turning of the power, reducing railroad revenues in times of peak load and swells labor costs, thereby increasing railroad expenses. Railroad net operating income is therefore attacked on both sides, being in effect limited in many cases by the engine terminals which are at present unquestionably the weakest link in the transportation chain. The amount of transportation which the railroads can provide is plainly dependent on the number, size and condition of locomotives and on the average number of hours the locomotives can be operated each day. Every idle locomotive adds to railway costs—the interest on the investment in it continues accumulating whether it is pulling a train or waiting to get into an enginehouse. Under present conditions of railroad equipment and operation it is difficult to get more than an average of eight hours' service from a locomotive each day it is operated. Frequently the actual productive time is much less than that. Operating conditions have an important bearing on this short period of actual service, but the chief obstacle to increasing the output of locomotives is the antiquated and inadequate facilities at a majority of existing locomotive terminals.

Mechanical Officers and the Public

Elsewhere in this issue is an abstract of the discussion of a highly important subject, "How Mechanical Department Officers Can Help Improve Public Relations" by J. E. Bjorkholm, assistant superintendent of motive power of the Chicago, Milwaukee & St. Paul. 'It is not commonly appreciated what an influence mechanical officers can have on public opinion because their contact with the public is apparently much less direct than that of the traffic, operating and some other railroad departments. It should be remembered, however, that approximately one-quarter of a million men are employed in railroad mechanical departments, forming in themselves an appreciable portion of the public and associated in daily contact with mechanical supervisory officers. These employees influence the opinions of their neighbors and in many small railroad towns dominate the public opinion of the entire community. Plainly, in dealing with employees mechanical officers have a highly important direct and indirect influence on public opinion. The attitude of the public towards the railroads is also affected by the kind of service received from cars and locomotives as determined by their condition and by the efficiency with which maintenance of equipment funds, amounting to about one-quarter of a billion dollars annually, are expended. Mr. Bjorkholm well stresses four duties of mechanical officers which, if properly performed, cannot help having a decidedly beneficial effect on public opinion. (1) Maintain equipment so that service can be safe, reliable, rapid and adequate in amount. (2) Make the operation economical for the benefit of stockholders and to avoid furnishing arguments for those who are always ready to discredit private operation of the railroads. (3) Bring to the attention of the public by personal efforts and indirectly through employees the accomplishment and handicaps of American railroads. (4) Treat employees in such a way as to win their respect and support and this feeling will spread to the general public and be automatically transferred to the railroads.

Section Foremen in Large Cities

The problem of securing competent section foremen is encountered in its greatest intensity in the large cities. High rents, greater expense for food and the unattractive, semi-slum neighborhoods in which the foreman in a city is compelled to make his home all serve to raise a barrier to getting good men to transfer to an outlying section where rents are lower, space is to be had for a garden and his children are insured pure air and plenty of room for wholesome play. In the past the transfer to a terminal section with its higher rate of pay and increased responsibility was considered a promotion. In fact, it normally served as the intervening step between section and extra gang foremanship. But at the present time the differential in the wage rate and the opportunity for further advancement do not attract many promising foremen from the rural sections. As a result, the foremen in the cities are largely of a type, primarily foreigners, who are thoroughly reconciled to life in the densely populated portions of great cities. It is true that many of them make loyal, efficient employees, but on the whole they are not of as good a class as those who could be obtained if the positions were made more attractive. As a rule, therefore, the railroads are not using on their most difficult sections or placing in training for promotion the best and most efficient men in their maintenance-of-way forces. This is but another phase of the section foreman problem which is now so definitely presented to the managements.

Fuel Economy Depends on All Departments

So much has been said in regard to fuel conservation, that every railroad man is ready to give prompt assent to a statement of its importance. The impression is all too prevalent, however, that this is a subject that fundamentally concerns the men in the mechanical department, and that it is their province and duty to see that firemen and enginemen are given the necessary instructions and oversight to insure the firing and operation of the locomotives in a manner that will keep the consumption of fuel as low as possible. This is unquestionably of prime importance. It is also important that power be maintained in such condition that it can be operated economically. Instruction and oversight of enginemen, together with the best of maintenance, will not alone solve the problem. Neither will the equipping of locomotives with proved fuel saving devices. If the fullest economies are to be effected, it will be necessary for other departments—operat-

ing, engineering, purchasing—to co-operate and not put it up to the mechanical department as the sole factor. Large and frequently unnecessary fuel consumption results from calling an engine before trains are ready, also from running a freight train at a higher speed than the most economical, and then holding it for some time to meet an opposing train. Fast running and long waiting make big drains on the coal pile. The stand-by fuel consumption of a locomotive is considerable and far more than many operating men seem to realize. The engineering department should give more consideration to the fuel losses caused by lack of thought in laying out yards and engine terminals. Yard masters are in a position to contribute generously by the manner in which yard switching is planned and also by the way trains are made up. If a car has to be set out between terminals, its location in the train will largely determine the amount of fuel that must be burned to perform the movement. To repeat, fuel saving is something that concerns not only the mechanical department but all those who have to do with operation and maintenance, regardless of what department they may be in.

Proposed Abolition of the Labor Board

The intention of the railroad labor organizations to attempt to secure the abolition of the Railroad Labor Board in the present session of Congress is well known. A bill to revise the Transportation Act and eliminate the board has already been introduced in the Senate. Secretary of Labor Davis, in his annual report, has also indicated his disapproval of the present method of handling railroad labor controversies. The *Railway Age* has no intention of defending the work of the Labor Board in its entirety. We do believe, however, that in a period when open strife between the railroads and their employees threatened constantly, the board was directly instrumental in reducing strikes to a minimum. It is improbable that any other kind of body could have done as well. The attitude of the employees at the termination of federal control is well known. They were prepared to make the most extreme demands. If they had been dealing with the managements directly and without intervention, they probably would have followed the refusal of their demands with nation-wide strikes. The Labor Board, with its powerful backing of public sentiment, prevented this, and has finally succeeded in bringing about, or helping to bring about, a labor condition that is as nearly normal as we have had in years. It is not hard to understand why the labor organizations are seeking to destroy the present board. The board has repeatedly curbed the tendency of the unions to make excessive demands. Its decisions have been for the most part fair and defensible. On some occasions it has probably overstepped its power, notably in its refusal to approve the Pennsylvania's plan of dealing with its employees, but in the main its opinions, both for and against the railroads, have been just. The fact that the board has been able to inspire a favorable public sentiment has been one of its strongest attributes. Public opinion, led by the board, was a powerful factor in enabling the railroads to defeat the shopmen's strike last year against a wage award made by the board. It is probable that the fear of this same public opinion has served as a deterrent of strikes by other organizations since that time. The board has been too ready a refuge for disputants who have lacked the wholehearted desire to settle their quarrels themselves. Eventually, a more satisfactory arbitration board may be evolved. But the present board should not be abolished until a better plan of settling railway labor controversies has been made ready to take its place.

Excessive Irregularity of Employment

A PROBLEM of great importance to which railway officers and labor leaders ought, in the interests of industrial efficiency and humanity, to give more study is that of increasing the stability of employment in railway service. The railways must operate every day and night of the year. It might be assumed, therefore, that there are not great fluctuations in the number of persons employed by them. The monthly wage statistics of the Interstate Commerce Commission, which have been available only during the last four years, show that this is far from true.

There was a large increase in employees under government operation and in February, 1920, the number of employees averaged 1,970,525. There is always an increase in the spring and summer months, and in August, 1920, the number was 2,197,824. In April, 1921, it was only 1,542,716, the decline in the intervening eight months being no less than 655,108, or almost 30 per cent. In October, 1921, the number of employees was 1,754,136, an increase in six months of 211,420. In February, 1922, it had declined again to 1,545,040, or by more than 209,000 in four months. Nine months later, in November, 1922, the number of employees was 1,820,463, an increase of more than 275,000. In August, 1923, the number of employees was 1,973,505, which was an increase of almost 194,000 since January. The difference between the maximum and minimum number of employees in 1921 was about 211,500; in 1922, 352,639, and thus far in 1923 almost 194,000.

The enormous decline of business was the main cause of the very great reduction of employees between August, 1920, and April, 1921. The coal strike and the shop employees' strike in 1922 were largely responsible for the wide fluctuations in that year. The total number of employees in July, 1922, principally owing to the shop employees' strike, was almost 500,000 less than in the same month of 1923.

Traffic fluctuates from season to season as well as from year to year. When freight business is large the railways must increase the number of freight trains they run and the number of train service employees. When freight business declines they must reduce the number of trains run and the number of train service employees. One reason why the number of some classes of employees sharply increases and decreases is that their work is seasonal. In the northern part of the country most maintenance-of-way work must be done in the spring, summer and early fall because of the interference of winter weather conditions.

It cannot be denied, however, that the fluctuations in the number of employees are also largely due to policies of the railway managements. In the year 1923 there has been unusually little change in the volume of freight business from month to month, and yet there have been large changes in the number of employees. Poor business in 1921 and the shop employees' strike in 1922 resulted in a large amount of railway equipment getting into bad order. In accordance with the program of the American Railway Association the work of repairing this equipment was pushed with the greatest possible energy for some months this year, and this largely accounts for the increase in the number of employees that occurred. It is notable, however, that in September the number of employees had begun to decline, being about 27,600 less than in August. Reports regarding what has been done since then indicate that these reductions of forces have continued up to the present time.

It was to be expected that some reductions of forces would be made because of the seasonal decline of freight business. It is a very good time, however, to raise the question as to how far reductions of forces should be carried and as to

whether the time has not come when the railways should begin to try to maintain greater uniformity of employment. Now that equipment has been put in so much better condition than it was in a year ago there is not need of as large a number of men in the shops as has been employed most of the year. But if traffic continues to be anywhere near normal, should not equipment be kept steadily in at least as good condition as at present and as many men be employed as are required to do this?

Why should not a concerted effort be made to keep the number of locomotives requiring heavy repairs down to 15 per cent and the number of freight cars requiring heavy repairs down to 5 per cent at all times?

When business and earnings decline sharply some roads are forced to retrench severely in their maintenance expenditures in order to save themselves from bankruptcy, and the temptation to the managers of even strong roads to do so in order to make a financial "showing" is great. There can be little question, however, that in the long run it would be beneficial financially to the railways to carry on their maintenance work more uniformly from month to month and from year to year.

Deferred maintenance effects a purely nominal saving which almost always is later much more than offset by excessive expense incurred in making up for it. It artificially causes net operating income to be larger than it otherwise would be and gives the public and regulating authorities the impression that the railways are doing better than they actually are. Later when the deferred maintenance work has to be done, not only does it increase operating expenses and correspondingly reduce the net operating income that otherwise would be earned, but it causes the railways to be criticized upon the ground that they are "padding" their operating expenses. Large amounts of maintenance work were deferred in 1921 and 1922, and yet the large expenditures which consequently have had to be made in 1923 have been severely criticized. The railways probably would earn more net operating income on the average from year to year if they would make their maintenance expenditures more nearly on the "straight line" method.

What is more important, the interest of the employees should be considered. It is a terrible hardship to working men and their families for them to be thrown out of employment for weeks and months at a time. The feeling that their employment is uncertain is bad for them and their employer while they are working as well as while they are out of work. It is doubtful if large numbers of men ever were laid off by any employer without resenting it. The spirit bred among working men by uncertainty and irregularity of employment fertilizes the soil for the seeds of radicalism and socialism. If more employers would study and adopt means of reducing irregularity of employment fewer working men would be disposed to believe the criticisms and attacks made upon the managers of industry by the radical leaders.

We believe that the operation and maintenance of the railways would be more economical and the relations between them and their employees would be much more friendly if fluctuations in the number of men employed by them were reduced to the lowest possible minimum. The subject is one which might well be studied jointly by the officers and representatives of the employees of each railway.

THE PULLMAN COMPANY, on December 31, will have paid $250,000 during 1923 to beneficiaries of those who died in the service of the company, under the benefit and insurance plan which was put into effect in January of this year. Included in this is the sum of $1,200 which will be given to the niece of the porter who was killed in the wreck of the Twentieth Century Limited at Forsyth, N. Y., on December 9.

Books and Special Articles of Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

A Comparison of the Deoxidation Effects of Titanium and Silicon on the Properties of Rail Steel, by George K. Burgess and G. Willard Quick. Technological papers of the Bureau of Standards, No. 241. [Part of Vol. 17.] p. 581-635. Published by the Government Printing Office, Washington, D. C.

Decisions of Courts and Opinions Affecting Labor, 1922, compiled by Lindley D. Clark and Daniel F. Callahan. See Index under "Interstate Commerce," and "Railway." U. S. Bureau of Labor Statistics Bulletin No. 344. 421 p. Published by the Government Printing Office, Washington, D. C.

Report of a Special Committee [of National Association of Railway and Utilities Commissioners] on Uniform Regulatory Laws. December, 1923. Includes a comparative survey of existing regulatory statutes affecting railroads and public utilities. 307 p. Publisher not given, but probably obtainable from the Secretary of the Association, New York City.

The Wheat Situation—a Report to the President, by Henry C. Wallace, Secretary of Agriculture. "Freight rates as a factor," p. 20-24. 126 p. Published by Government Printing Office, Washington, D. C.

Periodical Articles

Here's a New One! "Sleeping-car" buses between Staunton Winchester and Roanoke, Va. Bus Transportation, December, 1923, p. 594.

Is Civilization Desirable? by George Bernard Shaw. Mr. Shaw's ideas on division of labor and the eight-hour day. Caption title: "Shaw breaks a lance with civilization." New York Herald Magazine, December 16, 1923, p. 1-2.

Metals in Engineering Service. A Few Notes on Design, Choice of Materials, and Inspection of Failures, by Gordon Sproule. Cast iron car wheels, p. 523-525. Engineering Journal [Canada], December, 1923, p. 523-530.

A Method of Calculating a Fair Rate for the Transportation of Western Coal, by M. J. Butler. Rates for coal in train-load lots from Alberta to Ontario with suggestions for suitable equipment. Engineering Journal [Canada], December, 1923, p. 531-534.

Northwest Wheat—a First-Hand View, by H. A. Haring. "It is freight-rate adjustment that the West wants, not price legislation." p. 756. Annalist, December 10, 1923, p. 755-756, 783.

The Railway Situation in Italy After Seven Months of Fascista Control, by R. Angelone. Author is Acting Commercial Counselor, Italian Embassy. Economic World, December 15, 1923, p. 832-833.

The Town That Had an Alias, by Calvin Johnston. A short story in which an Irish switchman explains why brakemen have one sound to announce all stations. Saturday Evening Post, December 15, 1923, p. 6-7, 48-56.

Value of the Traffic Manager in Business, by Hubert T. Parson. What a Traffic Department saves the Woolworth Company, with some suggestions for railroad-shipper relations. Shipper & Carrier, December, 1923, p. 493-494.

Want Same Demurrage Rules. Operating Conditions of Sand, Gravel and Coal Industries Being Identically the Same, Same Demurrage Rules Should Apply. National Sand and Gravel Bulletin, December 15, 1923, p. 5-7, 24-26.

Letters to the Editor

[*The* RAILWAY AGE *welcomes letters from its readers and especially those containing constructive suggestions for improvements in the railway field. Short letters—about* 250 *words—are particularly appreciated. The editors do not hold themselves responsible for facts or opinions expressed.*]

"Decretion"

TO THE EDITOR:

Referring to my letter in the *Railway Age* of December 1, 1923, "Funding Depreciation Reserve," it has been suggested to me that my statements might be clarified by an analysis and concrete example on "Decretion."

Consider that the owner of a public utility property "A," say five years old with a given life expectancy, buys a similar property "B" brand new having the same life expectancy, merges the two into one property, each property losing its individual identity in the merger. He assumes less liability for renewals on the merged property than the sum of the liability for renewals of each property considered independently by separate owners, because in order to maintain, the owner of "A" alone has before him the liability of restoring all of his property "A" to a condition of new at one time. The owner of "B" alone has a like liability of restoring all his property new before him at one time. But the owner of "A" and "B" as one property at any time after the merger will never be called upon to restore all of his property "A" and "B" to a condition of new at one particular time. This difference in liability represents "decretion."

From a reserve standpoint, the owner has the use of the reserve accumulated on property "B" in restoring property "A," and likewise the reserve accumulated on property "A" in restoring property "B," and so on.

Let property "A" represent an automobile costing $1,000 in the year 1900; and property "B" represent a similar automobile costing $1,000 in 1905, each having an arbitrary life expectancy of 10 years. Assume that the same cost and service life apply to all renewals. On the straight line basis, the annual rate of depreciation is 10 per cent. In 1905 at the acquisition of property "B" the depreciation or reserve (if built up) on "A" amounts to $500. In 1910 the depreciation or reserve on the two automobiles "A" and "B" amounts to $1,500, of which $1,000 is necessary to replace "A."

In 1915 the depreciation or reserve again amounts to $1,500, of which $1,000 is necessary to replace "B," and so on, indefinitely, $500 "decretion" or reserve always in excess of the amount required to maintain the two automobiles.

Should the owner of "A" have accumulated the reserve of $500 in 1905 for renewal purposes, when he acquired "B," he might have used this reserve for his personal benefit, and the 10 per cent depreciation charges applied to the two automobiles from that time on would make the necessary renewals to maintain this public utility with the same degree of safety as could be given by separate owners, using all of the reserve on both automobiles for renewal purposes.

All public utilities consisting of independent, depreciable units must have "decretion" as represented by the $500 in these two automobiles after 1905. As a result, two important questions are before the public and its utilities at this time, the latter question dependent on the first. The questions based on above example are:

First: In determining a rate base for automobiles "A" and "B" on a valuation date after 1905, shall this $500 "decretion" be deducted from cost value?

Second: Shall the public, in addition to renewals, reimburse the owner or establish a reserve through increased tariff rates to meet this $500 decretion?

MARCUS A. ROBY.

Systematic Whistle-Signaling

ALTOONA, Pa.

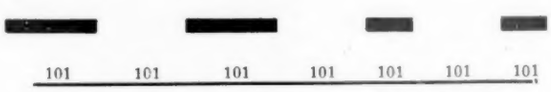
TO THE EDITOR:

After carefully reading the letters of F. W. M. and F. E. C. in your issue of December 8, concerning the use of the locomotive whistle at highway grade crossings, I desire to enter my division as a candidate for marking at 100 per cent for correct whistling, as suggested in your editorial on page 1042.

As you say, compromise may be necessary between the extreme views of those who want an almost continuous succession of sounds from the whistling post to the crossing, on the one hand, and those who want a very short signal, on the other. Several years ago we took up the ragged whistling problem on the Middle division, and after full discussion at the superintendent's staff meetings, we agreed on a uniform method; and we believe we have achieved satisfactory results.

We have set up in the instruction room and at places where enginemen gather a simple device comprising a seconds pendulum (a yard of string, a nail and a bolt will make one) with a buzzer worked by a dry battery and energized when the engineman pulls a piece of rope representing the whistle cord in the cab. As the pendulum swings in front of his eyes, he makes the first long blast, of one second duration. In other words, he pulls the rope while the pendulum swings from, say, left to right. He lets up on the cord while it is swinging from right to left. He pulls it again in the same way for the second long blast and its corresponding pause of one second; and then as the pendulum starts on its swing, pulls until it crosses the center, and lets up; and pulls again when it crosses the center on the next swing, holding on to the end of that swing. This takes six seconds to sound the complete warning; and at 60 miles an hour this covers 528 ft. of track.

We have also instructed our men by means of another system, which is not dependent on their presence in the instruction room; they can carry it around with them, outside, and use it anywhere on the road. They measure time by the use of their own voice. By repeating "one hundred and one" for each second, and "one hundred" for each half second, the highway crossing whistle signal would be sounded as shown below. The longer marks represent seconds of time and the shorter ones half seconds. The figures below the marks indicate the *words* to be pronounced in measuring time.

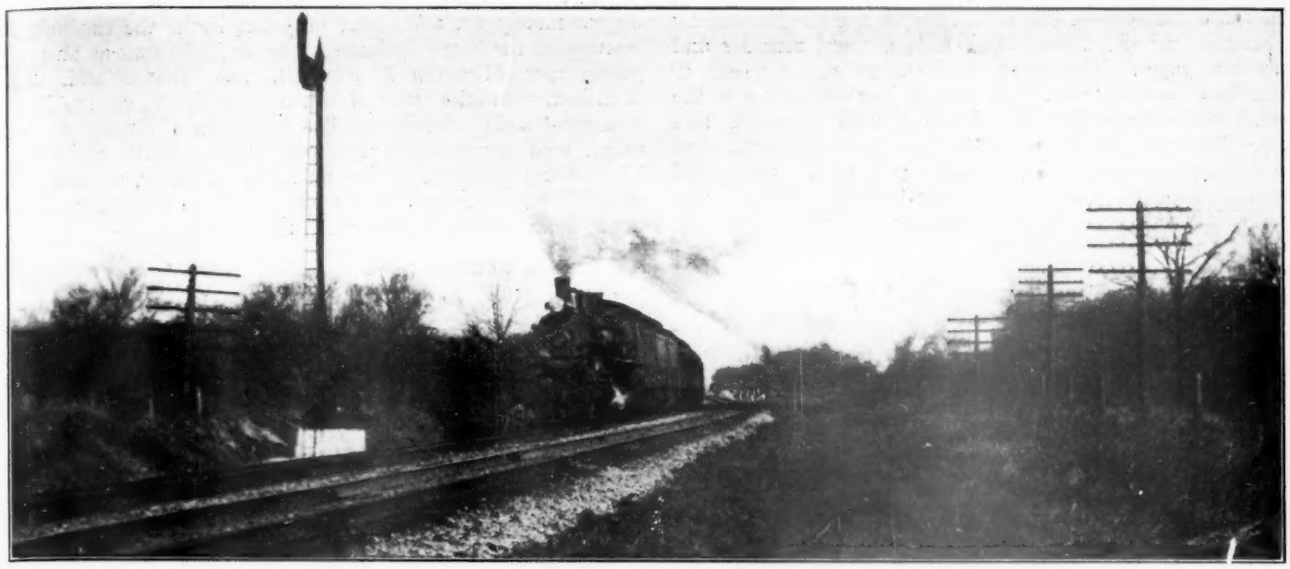


WM. ELMER,
Superintendent, Middle Division, Pennsylvania Railroad.

The Traffic Club of Nashville, Tenn., was organized on November 30. Officers elected were R. D. Herbert, of the W. G. Bush Brick Company, president; W. H. Wharton (N. C. & St. L.), first vice-president; T. M. Henderson, Nashville Traffic Bureau, second vice-president; Thomas Newbill, of C. E. Rose & Co., third vice-president; Earl Roach (N. C. & St. L.), secretary; and W. A. Gunn, Purina Mills, treasurer.

"And, lo, the star, which they saw
in the east, went before them
till it came and stood over where
the young child was.
"When they saw the star, they rejoiced
with exceeding great joy."

Mat. 2. 9, 10.



Locomotive Passing Over Clear Ramp

Rock Island Places Train Control in Service

The Installation Is the First to Be Inspected Officially by the I. C. C. Under the Order

THE CHICAGO, ROCK ISLAND & PACIFIC, in compliance with the Interstate Commerce Commission's Order No. 13,413, has installed automatic train control on 165 miles of its double track main line between Blue Island (Chicago), Ill., and Rock Island. The automatic train control system of the Regan Safety Devices Company, Inc., as used on this installation, is the intermittent ramp contact type, with speed control. The roadside equipment consisting of the ramp and circuits connecting the train control and automatic (visual) signal system, was completed on November 1. There are 89 road engines assigned regularly to the Illinois division, of which 38 are for passenger and the rest for freight service.

Rocky Mountain Limited Westbound in Train Control Territory

An official inspection of this train control installation was made by W. H. Harland, chief of the division of signals and train control of the I. C. C., and his staff, during the latter part of November and it was pronounced complete and in full compliance with the requirements of the commission, as was announced by the railroad on December 4. Therefore, the Rock Island is the first road to receive an official inspection and approval of an automatic train control installation on a full engine district, as specified in the order.

Record of Tests Made

The inspection and test of the roadside apparatus was made by parties, each consisting of two inspectors of the Interstate Commerce Commission, accompanied by representatives from the Rock Island and the Regan Company. One of these parties started from Blue Island on November 19, and one from Rock Island on November 20. The inspection and test at each location consisted of measurements of gage and height of ramps, check of potential and polarity, and a general examination of the construction at each location. A check was also made of switch protection, overlaps, grade, etc. All ramp locations throughout the installation were examined in detail by the government inspectors.

An inspection and test was made of each equipped locomotive to determine the integrity of the apparatus, including operation under the several conditions of train control, such as unlimited speed, limited speed and stop, with tests of the integrity of the circuits, grounds, elevation and gage of shoe mechanism, etc., including the seals applied to the air cocks. These tests were also to determine whether the installation was made in accordance with the plans. Observations of the automatic train control apparatus in regular train service were made, with a record of date, engine number, train number, signal indications, speed of train, reduction in pounds of brake pipe pressure, and whether the apparatus operated as intended.

At the request of the Interstate Commerce Commission a special train was run from Blue Island on November 30, for

the purpose of demonstrating the flexibility of the system. The train consisted of engine 1328 with five cars, including a business car which was fitted with a speed recorder and train-line gages. Tests were made at unlimited speed, at prescribed medium speed and at stop, corresponding to the signal indications—Proceed, Proceed with Caution, and Stop. The purpose of these tests was to demonstrate that the apparatus operated as intended and at the prescribed speeds at which it was set. On the return trip the train was operated with the locomotive running backwards and the various indications were received the same as when the locomotive was running forward.

Territory Included and Traffic Handled

Blue Island, Ill., is 15.7 miles from the La Salle street station, Chicago, and is considered as the end of the Chicago terminal district, as the majority of the suburban trains from the city terminate at Blue Island. The passenger traffic on the Illinois division is broken up at Joliet, which is 24.5 miles west of Blue Island and at Bureau, Ill., which is 98 miles west of Blue Island. In addition to the through trains there are eight suburban trains each way between Joliet and Chicago. Bureau is the junction with a branch to Peoria, Ill., and three passenger trains each way are run between this point and Chicago. Therefore a summary of the passenger train movements is as follows: Blue Island to Joliet, 18 passenger trains each way, Joliet to Bureau, 10 passenger trains each way, Bureau to Rock Island, 7 passenger trains each way. The Rocky Mountain Limited, train No. 7, westbound, traverses the 165 miles of train control territory in 3 hr. 40 min., at an average scheduled speed of 43.5 m.p.h. One of the Joliet suburban trains runs at an average speed of 40.2 m.p.h.

For the six months' period from June to November, 1923, inclusive, there was an average of 13 eastbound and 12 westbound freight trains on the Illinois division for each 24-hr. period. The freight train speeds average between 13.1 m.p.h. and 17 m.p.h. The ruling grade of 0.62 per cent for approximately six miles east of Joliet limits the eastbound tonnage of the larger freight engines to 3,370 tons as an adjusted rating between Morris, Ill., and Blue Island. At Tiskilwa, nine miles west of Bureau, the line leaves the Illinois river valley and climbs 154 ft. within a distance of 14 miles, with a maximum westbound grade of 0.6 per cent. This ruling grade establishes an adjusted rating, westbound, of 3,470 tons between Bureau and Sheffield, requiring additional train movements between these points.

Automatic Control as Connected With the Signaling

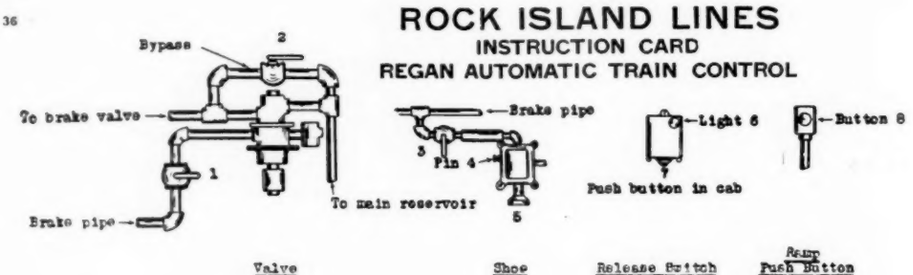
In addition to the complete system of three-position automatic block signals in the train control territory the signaling includes two electric interlocking plants, one electro-mechanical and three mechanical interlockings, all of which are equipped with modern electric track-circuit locking. A contact ramp 80 ft. long is located approximately 65 ft. from each automatic and each home interlocking signal. The present installation includes 240 ramp locations, eight of which are intermediate ramps (which are described below) and two clearing ramps. The average distance between signals is 1.4 mi., the shortest block being 3,000 ft. and the longest block being 2.5 mi.

As the ramps are located close to the signals it was necessary to extend the line control circuit of each signal to give overlap protection into the next block. That is, a signal will now remain at stop until a train has passed through the block and also proceeded into the next block the distance of the overlap. It is intended that these overlaps shall provide protection for "train stopping distance" with the service application of the brakes at the speed regulated by the train control apparatus, taking into consideration the gradient. The term "stopping distance," as here used, is therefore somewhat different from the term "braking distance" which is required to stop a train at maximum speed.

Generally the overlaps were provided by changing the

FORM M. P. 36

ROCK ISLAND LINES
INSTRUCTION CARD
REGAN AUTOMATIC TRAIN CONTROL



1. TO CUT DEVICE OUT OF SERVICE: Close cock 1 so that handle is in line with pipe and open cock 2 on bypass so that handle is crosswise with pipe. In case of heavy leak of air at shoe box also close cock 3 so that handle is in line with pipe.

2. TO PLACE DEVICE IN SERVICE: Open cocks 1 and 3 so that handle is crosswise with pipe and close cock 2 on bypass so that handle is in line with pipe.

3. DOUBLE HEADING: When double heading, on rear engine Raise shoe stem 5 to full height; pull out locking pin 4, give it one-quarter turn and see that it has entered the slot full length.

4. OPERATION:

(a) The train control apparatus does not interfere with the proper observance of rules governing air brake operation.

(b) CAUTION SIGNAL will enforce speed throughout the block not to exceed 40 miles per hour for passenger trains and 30 miles per hour for freight trains. To avoid unnecessary application of the brakes, speeds should be maintained below these limits.

(c) STOP SIGNAL: At a stop block, ramp push button number 8 on tank must be pushed in before shoe engages ramp, and held in so long as shoe is on ramp. If stopped with shoe on ramp, button 8 must be pushed in and held in until shoe is off ramp.

(d) A stop signal will enforce speed not to exceed 15 miles per hour throughout the block for both passenger and freight trains. To avoid unnecessary application of the brakes, a speed should be maintained below that limit.

(e) RELEASE SWITCH IN CAB: Whenever device makes brake pipe reduction, place brake valve in lap position until train is running below prescribed speed; then when indicator light 6 is displayed, push the button 7 which will extinguish the light, and proceed to fellow prescribed rules of proper air brake operation as though you had made the application yourself.

(f) IN CASE OF IMPROPER OPERATION: Should the device improperly apply the brakes, it must not be cut out of service until the ramp next ahead has been passed. The only exception to this rule will be permitted when, with the train at stop, it is impossible to release the brakes after pushing button 7.

(g) Report any improper working of the device to the Train Dispatcher and on work report.

The Instruction Card Placed in the Locomotive for the Guidance of the Engineman

wiring of the signal system so as to include the first track section of the next block, although at some locations new track sections were required. The longest overlap in automatic territory is on a 0.41 per cent ascending grade and is 3,400 ft. long and the minimum is 1,375 ft. long on a 0.4 per cent ascending grade. At the interlocking plants there are no overlaps. However, approaching an interlocking, an intermediate ramp is located between the distant signal and the home signal in order to obviate the overlapping of the distant signal within the home signal limits. At one interlocking, the ramp is 1,100 ft. from the home signal on a 0.4 per cent ascending grade. This is at a point where permanent speed restrictions are in effect. The maximum is 1,300 ft. on a 0.03 per cent ascending grade.

Ramp Circuits

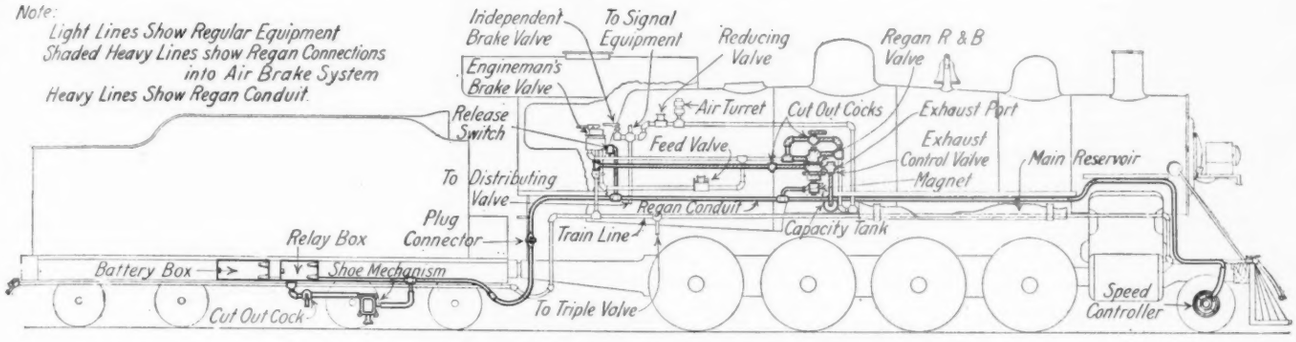
A 10-volt battery is used with each ramp. At most of the locations this is a 16-cell caustic soda battery, although as a.c. power is available at Joliet, storage batteries on a.c. floating charge are used there. The feed circuit for the ramp is carried through a contact on the line relay and through circuit contacts on the signal mechanism; and the other side of the battery is connected to the rail. The circuit is completed so as to draw current only when a locomotive shoe passes over the ramp.

A contact device is provided at the ramp for the purpose of checking the position of the ramp. If the ramp should be knocked out of line 5/8 in. the control circuit of the signal in the rear is opened, causing the signal to go to stop; and consequently placing the ramp at that signal in a condition to stop trains.

Train Control Equipment on the Locomotive

The engine equipment consists primarily of a contact shoe, an electro-pneumatic graduated valve, a speed controller, an indication selector and a storage battery. Stated briefly, the system functions as follows: The shoe, in riding up a ramp, opens an air port, operating the graduated valve, unless this valve is held closed by an electric circuit that is controlled indirectly by energy from the ramp itself. The ramp circuit from the shoe is carried to an indication selector, which in turn controls the circuit which operates the graduated pneumatic valve.

While traveling between the ramp locations the indication selector is held in the last operating position by the local engine circuit, which is supplied with energy from a storage battery on the locomotive. At a signal indicating "proceed" the ramp supplies positive current consistent with that indication and no further action takes place until the next ramp is encountered. At a signal indicating "caution," negative



Showing Application of the Regan Apparatus to a Typical Locomotive

Ramps Are 80 ft. Long and Located Approximately 65 ft. from the Signal

current is supplied to the shoe, thus bringing into play the speed control features.

The medium speed for passenger trains is 35 m.p.h. and for freight trains 25 m.p.h. Trains are expected to enter a caution block at a rate below the prescribed rate. If this rate is in excess of the medium speed requirement then the brakes will be applied automatically, but after the speed has been reduced to a point below the medium speed, the brakes may be released and, if the engineman is alert, the train may be made to proceed through the block at or below this speed without a stop.

In case the train operates in a "caution" block to a speed above a medium speed requirement, then an automatic application of the brakes will take place. The engineman must then acknowledge the speed restrictive condition and release the brakes, after the speed has been reduced to a point below the prescribed medium speed, to allow the train to proceed under the restrictive speed; otherwise the train will be brought to a stop.

At a signal indicating "stop" the ramp is de-energized; hence, as there is no current for the shoe to pick up, it functions to cause the air pressure to be reduced in the train line to give a service application of the brakes. Upon encountering this stop indication the engineman may proceed through the block at a speed not to exceed 15 m.p.h. provided he acknowledges the condition. The system is designed not to require stopping at the signals indicating "stop" for those roads who may so elect to use the equipment.

Complete instructions for the government of enginemen concerning the train control operation are printed on a card as shown in the illustration and such a card is framed and mounted in each engine cab.

Rock Island Train Control Installation Approved

WASHINGTON, D. C.

THE INTERSTATE COMMERCE COMMISSION on December 17 issued an order approving the installation of the automatic train control device of the Regan Safety Devices Company, Inc., on the Chicago, Rock Island & Pacific, Illinois division, between Blue Island, Ill., and Rock Island, Ill., 165.4 miles, double track, except for certain suggested changes concerning the signal system upon which the train control device is superimposed. As a result of inspection and test the commission finds that the device itself as installed meets all the requirements of the commission's specifications as contained in the order directed to 49 railroads on June 13, 1922. This is the first installation on one of the roads named in that order to be approved by the commission. The order establishes certain requirements as to inspection, tests and maintenance and the railroad company will be expected promptly to carry into effect the recommendations made with respect to the signal system.

The report, which is by Division 1, Commissioners McChord, Esch and McManamy, says:

The installation consists of an automatic train-control device of the intermittent electrical contact type. This device was first placed in service in March, 1920, on the Rock Island, between Blue Island and Joliet, Ill., a distance of 22.6 miles of double track road. The installation consisted of 20 equipped locomotives with 34 roadside ramps operating in connection with 32 automatic signals. From May, 1921, to March, 1922, this installation was under continuous observation by our bureau of safety and the American Railway Association.

Under date of February 24, 1922, we were advised by the Rock Island that the device had been in service between Blue Island and Joliet, Ill., for about two years and had done what its owners claimed for it, and that, at a meeting of the directors on February 21, 1922, the officers of the road recommended and the board of directors authorized and directed, upon approval by us of plans and specifications thereof, the extension of the automatic train-control installation from Joliet to Rock Island.

Under date of May 4, 1922, the Rock Island advised us that it was ready to install automatic train-control on its Illinois division between Joliet and Rock Island and transmitted in duplicate plans of the signal system in operation on this division, together with plans of the engine and circuits of the automatic train-control device of the Regan Safety Devices Company, Inc., and other information pertaining to the extension of the installation from Joliet to Rock Island with the request that the plans and information furnished be approved.

Under date of May 10, 1922, the commission approved the extension of this train-control system to Rock Island, a distance of 142 miles of double track. The installation was completed and placed in service on November 1, 1923, thus making a continuous installation between Blue Island and Rock Island, a distance of 165.4 miles of road, or 330.8 milesof track.

The roadside apparatus consists of a ramp located at each signal with the necessary wiring for connecting the train-control system with the automatic signal system; each ramp is provided with a ramp displacement device through which is carried the control wire for the next signal in the rear in such a manner that any displacement of a ramp is intended to open the circuit and cause the signal in the rear to assume the stop position.

The locomotive apparatus consists of the following:

1. A speed circuit controller of the centrifugal type the electrical contacts of which are set for speeds in accordance with the railroad company's requirements.

2. An electro-pneumatic brake valve with exhaust control valve and air capacity chamber which is interposed directly in the air supply line between main reservoir and the engineman's brake valve. It is also provided with a connection to the brake pipe. When the electro-magnet of this device is energized that part of the valve controlling the brake pipe vent is closed and the part controlling the main reservoir pressure is open and main reservoir pressure is free to flow to the engineman's brake valve in the usual manner. When an automatic application is made the electro-magnet is deenergized, and main reservoir supply to brake valve is cut off to prevent releasing the brakes, and the brake pipe air vented to atmosphere via the exhaust control valve.

The exhaust control valve is so designed and constructed as to permit a 30 per cent reduction of the initial brake pipe pressure, after which it automatically closes the brake pipe vent thus preventing the exhausting of the entire brake pipe system while providing for a service application of the brakes. In case it is desired to cut the train control out of service, by-pass air connections are provided, controlled by angle cocks normally sealed.

3. An electro-magnetic release switch and light indicator. The function of the indicator is to advise the engineman, after an automatic application of the brakes, when the speed of his train has been reduced to the enforced lower rate of speed, after which he may, by first operating the release switch, then release the brakes in the regular manner. The release switch is constructed so that it cannot be held closed, and its operation prior to reducing the speed of the train to the point where the indicator will be lighted will not effect a release of the brakes.

4. A push button known as the "stop ramp button." This must be operated in order to avoid an automatic brake application while going over a deenergized ramp, when passing a stop signal to enter a danger block at or below prescribed

low speed. Exceeding the low speed limit will cause the brakes to be applied at any time in a danger block irrespective of the forestalling feature.

5. A shoe mechanism, on the right hand side of the locomotive for forward running, and on the left hand side for backward running. This shoe apparatus consists of a shoe stem and a circuit controller. The contacts of the circuit controller operate with the shoe stem and are closed with the shoe down and open with the shoe up, thus selecting between locomotive and roadside energy, but overlapping in their movement sufficiently to avoid breaking the indication selector circuit. The shoe stem is held down in position for contact with the ramp by means of air pressure. The shoe stem is drilled throughout its length so as to insure an application of the brakes in case it is broken off in service.

At a clear signal.—The shoe receives energy from the ramp to cause a clear or proceed indication to be transmitted to the engine apparatus, and this indication is maintained until the shoe engages the next ramp.

At a caution signal.—When the shoe engages the ramp energy of a different polarity actuates the engine apparatus to the caution position; and this indication is maintained throughout the caution block, and the speed circuit controller is automatically connected into the engine circuit in such a manner that it will operate an automatic service application of the brakes if the train exceeds the prescribed medium speed. When the speed has been reduced to the point at which the controller is set it operates to close a circuit to light the cab indicator, thus notifying the engineman that he may take the proper action to release the brakes. Should he for any reason be incapacitated, or fail to take advantage of this opportunity, the brakes would continue to apply and stop the train.

At a stop signal.—The shoe receives no energy from the ramp and the engine circuit is opened, thus causing an automatic application of the brakes. However, a stop signal may be passed and the train enter the danger block without receiving a brake application if two requisites are complied with, namely, "stop ramp button" must be held closed while the shoe engages the stop ramp, and the train must be operating at, or below, the prescribed low speed. The train may then proceed and is automatically restricted throughout the danger block to the low speed limit, the brakes applying automatically whenever the train exceeds that speed. After each automatic application of the brakes, the cab indicator will light when the speed has been reduced sufficiently for the engineman to effect a release; if no action is taken the brakes will continue to apply and stop the train.

Our order in Automatic Train-Control Devices, supra, provides:

"That each installation made pursuant to this order shall, when completed, be subject to inspection by and the approval of the Commission or any division thereof to which the matter may be referred."

This device has heretofore had the commission's approval. Therefore, the purpose of this inspection and test was to determine if the installation was made in accordance with the plans furnished and the specifications and requirements of our order. As a result of this inspection and test it has been found that the device itself as installed meets all the requirements of the commission's specifications and order in *Automatic Train Control Devices Supra* and its installation is, therefore, approved, except as hereinafter indicated.

The Rock Island will be expected to comply at once, with the following requirements as to inspection, tests and maintenance. (1) To insure the proper and safe operation of the locomotive apparatus, arrangements should be made by the railroad for a careful inspection and tests of the train control equipment by skilled employees on the arrival of all locomotives at a terminal or roundhouse. This inspection and tests should include all parts of the apparatus; all sealed air cocks should be inspected to see that the seals are unbroken and that the apparatus is properly cut in service before leaving. A daily report as to the conditions of the apparatus should be made on a form especially provided for that purpose and forwarded by the inspectors to the proper authority. (2) The roadside apparatus should be frequently inspected and tested for crosses, grounds, and polarity, the alignment of ramps and the proper adjustment of the displacement detector and a report made on a form provided for that purpose and forwarded by the inspectors to the proper authority. (3) A form should be provided for the engineman on which to report all failures of the apparatus or any irregularities in the operation of the device. (4) The shoe housing and other accessible parts of the apparatus should be padlocked or sealed.

Certain situations were noted which, in our opinion, should be corrected by the railroad company as a precautionary measure in order to secure a greater degree of safety and to prevent a possible failure properly to protect train operations, in so far as it concerns the signal system upon which this train control device is superimposed. In the following specific respects the railroad should promptly take the necessary action to carry into effect the recommendations made:

(1) Location of clearing ramp when leaving train-control territory at signal 162 should be changed so as to provide protection for a train standing in the overlap of signal 170.

(2) All cross-over switches between main tracks and sidings should, when used, be so arranged as to give maximum protection to main track traffic, through the proper signal indication.

(3) All movements leading to main tracks should be protected through the signal system.

(4) Movements by signal indication through all interlocking should be at low speed except that where a more favorable indication is desired full train control protection should be provided through the signal system. The train control ramp indication should be made to conform to the signal indication, opposing signals should not be cleared simultaneously.

(5) Some of the signal overlaps, in our opinion, are not of sufficient length to provide braking distance at the present medium speed.

(6) The medium speed of 37 miles per hour for passenger trains is, in any event, considered too high and a lower speed is recommended.

(7) Protection should be provided against a train on siding, following a train on the main track, without restriction as to speed.

(8) Sign boards should be placed to indicate the beginning and ending of automatic train-control territory.

While these recommendations do not reflect upon the train-control device itself, we feel that as a matter of caution the carrier's attention should be called to them and it should comply therewith in order that the greatest degree of safety may be insured. The attention of the Rock Island has been called to these matters and they indicated their willingness to comply with our recommendations in reference thereto.

A NEW RAILROAD Y. M. C. A. building was formally opened at Groveland, N. Y., on the Delaware, Lackawanna & Western, Tuesday, December 11. This replaced the smaller frame building which was destroyed by fire March 1, 1923. The new building includes a first-class cafeteria, lunch department, 26 individual sleeping rooms, and provision on the main floor for the secretary's living quarters—two rooms and bath with a separate side entrance. At the formal opening exercises Superintendent A. E. Staub, in an appropriate address, officially turned the completed building over to the Y. M. C. A. to operate in the interests of Lackawanna employees and people in the community who might desire to participate in its activities.

Freight Car Loading

WASHINGTON, D. C.

REVENUE FREIGHT CAR LOADING during the week ended December 8 reflected the seasonal drop which is usual at this time of the year, but still showed an increase of 4,600 cars as compared with the corresponding week of last year. The total was 913,774 cars as compared with 909,174 last year and 741,341 in 1921. Three districts, the Eastern, Allegheny and Central Western, showed totals less than those for the corresponding week of last year. This is accounted for largely by the falling off in coal traffic. Loading of grain and grain products, coal and coke showed a decrease as compared with the corresponding week of last year, but there was an increase of 18,841 cars in the loading of merchandise.

The summary as compiled by the Car Service Division of the American Railway Association follows:

REVENUE FREIGHT LOADED WEEK ENDED SATURDAY, DECEMBER 8, 1923

Districts	1923	1922	1921
Eastern	222,413	229,149	187,915
Allegheny	184,930	197,375	152,500
Pocahontas	37,314	31,939	25,929
Southern	134,994	134,342	111,879
Northwestern	119,433	109,274	94,177
Central Western	149,295	150,383	109,988
Southwestern	65,395	56,712	58,953
Total Western Districts	334,123	316,369	263,118
Commodities—			
Grain and grain products	51,681	55,412	48,513
Live stock	42,931	37,603	31,562
Coal	173,156	197,818	138,215
Coke	11,393	13,015	6,671
Forest products	64,345	62,655	49,474
Ore	11,709	10,168	5,984
Mdse. L. C. L.	245,879	227,038	226,421
Miscellaneous	312,680	305,465	234,501
Total	913,774	909,174	741,341
December 1	835,296	840,412	741,849
November 24	990,217	946,642	673,465
November 17	991,745	957,564	790,363
November 10	1,036,067	944,186	755,777
Cumulative loading for year to date	47,422,760	40,797,973	37,401,923

Locomotives in need of repair on December 1 totaled 10,572 or 16.4 per cent of the ownership, according to reports filed by the Car Service Division of the American Railway Association. This was a decrease of 224 as compared with the number on November 15, at which time there were 10,796 or 16.8 per cent. Of the total, 9,755 or 14.9 per cent, were in need of heavy repair on December 1, a decrease of 224 under the number in need of such repair on November 15. Reports also showed 995 or 1½ per cent in need of light repair, the same number as reported on November 15. The railroads on December 1 had 3,367 serviceable locomotives in storage, an increase of 759 since the middle of November. The railroads also repaired and turned out of their shops during the last 15 days in November 21,178 locomotives, including those which received very light repairs, an increase of 990 over the number repaired during the first half of the month.

On the same date 155,626 freight cars or 6.8 per cent of the ownership were in need of repairs. This was an increase of 6,434 over the number on November 15, at which time there were 149,192 or 6.5 per cent. Of the total 116,697 or 5.1 per cent were in need of heavy repair on December 1, an increase of 163 freight cars over the number on November 15. Reports also showed 38,929 or 1.7 per cent in need of light repair, an increase of 6,271 during the same period.

A total of 21,973 new freight cars and 333 new locomotives were installed in service during November. This brought the total of new freight cars placed in service from January 1 to December 1, this year, to 177,845, while 3,704 new locomotives were installed during the same period. Of the new freight cars, box cars installed during the month totaled 9,661; coal cars, 9,179; refrigerator cars, 1,549; and stock cars, 465. The railroads on December 1 had 36,789 new freight cars on order with deliveries being made daily. There were also 739 new locomotives on order.

The freight car surplus for the first week of December averaged 197,128 cars, while the shortage amounted to only 502.

Electric Outpulls Steam Locomotive

IN CONJUNCTION with the tests of the Paris-Orleans locomotive, described in the December 8 issue of the *Railway Age*, tests were also made on one of the electric locomotives built for the Mexican State Railways. The Mexican locomotives were described in the *Railway Age* for December 1, 1923, page 1021. A steam locomotive was used to push the electric while power was returned to the line by regeneration. At a speed of 14 miles an hour, 1,800 hp. was returned to the system.

A tug of war exhibition was also made with the steam and electric locomotives. The steam locomotive was a Mikado equipped with all modern improvements including a booster.

New York Central Mikado and Mexican State Electric Locomotives in Pulling Contest

The weight on drivers of the two locomotives was the same within the limits of the scales; i. e., 306,000 lb. This included the booster in the case of the steam locomotive. There is, however, a difference in the rated tractive efforts of the two locomotives. The rating of the electric locomotive based on 3.33 adhesion factor is approximately 92,000 lb. The rating of the steam locomotive is 78,100 lb. The two locomotives were coupled together and at a given signal applied power in opposite directions. The electric held the steam locomotive and then pulled it backwards. From readings taken of the current used, a fairly accurate calculation of the draw bar pull was made as follows:

Balanced draw-bar pull at standstill, 86,000 lb.

Electric hauling Mikado backwards, 94,000 lb. approximately.

Other tests were made showing that the steam locomotive could be allowed to reach a low speed before power was applied by the electric, and given this advantage, the electric locomotive was able to stop and haul the steam engine backward. In all of these tests the rail was well sanded.

The Financial Aspects of Railway Consolidation*

General Situation Analyzed—Effect on Four Eastern Coal Carriers Taken as Example of Probable Future Results

By F. J. Lisman

WHEN COMPULSORY consolidation was first discussed, Wall Street promptly concluded that this would mean an advance in the securities of all the weak properties and that stocks of the weak roads, like the Atlantic, Birmingham & Atlantic, the Minneapolis & St. Louis, the Seaboard Air Line, and the New York, New Haven & Hartford would promptly advance.

Many discouraging conditions have developed since the passage of the Transportation Act in 1920, and up to a short time ago the financial markets were not inclined to discount favorable news of any kind which had to do with railroads. This was especially the case because upon closer examination of the act it developed that immediate consolidations were not likely owing to the apparent unsurmountable legal difficulties in the way. Lawyers seemed to be unanimously of the opinion that it would be unconstitutional to compel any company to purchase or take over the property of another company at a price which was not satisfactory to the buyer; in some cases directors and stockholders of a company might not be willing to take over another company at any price. Furthermore, there seemed to be no method by which the stockholders of a company could be compelled to sell their property or shares at a price which they deemed inadequate.

The idea of compulsory consolidation arose from the fact that the shippers along the weaker roads were not getting satisfactory service. It was thought if these weak roads became part of stronger systems, they would find the necessary capital to properly develop their facilities.

The framers of the Transportation Act fully realized that the railroads as a whole were entitled to earn a fair return on the capital invested. A few of the stronger railway companies were earning more than was deemed a fair return while many large and small companies were and are earning a very small rate of interest on the capital invested in their properties. As an incentive to the stronger companies to take over the weak ones, it was decided to take away or recapture one-half of their surplus earnings over and above 6 per cent on a fair value of their properties. This was to be an inducement to the strong to take over the burden of operating and developing the weak companies and to also secure increased dividends on their own stocks by getting the benefit between the earnings of these weak companies and the 6 per cent on their values.

If the Transportation Act is given a fair chance to work out, consolidation will undoubtedly follow to a very large degree. If a company with a valuation of, say, $400,000,000 should be earning $30,000,000, or 7½ per cent on its capital, it would under present conditions have to turn over to the government $3,000,000. If this company should absorb a weak corporation with a physical value of $150,000,000 on a basis of assuming an interest charge of $3,000,000 it would not have to pay anything back to the government. In that event the stronger company would be entitled to earn $9,000,000 additional, or 6 per cent, on a total value of $550,000,000, before dividing with the government; it could therefore distribute to its own stockholders the $3,000,000 which otherwise it would have to pay over to the government.

As the Transportation Act stands at present the Interstate Commerce Commission is merely instructed to prepare a plan for the consolidation of the railway properties into a limited number of systems.

Extensive investigation and hearings have been held on this subject and the commission has a tremendous job ahead of it, in formulating a plan which can hardly be expected to appear until late in 1924.

After a plan is published it will undoubtedly create much opposition because there will be many sections and communities which will be dissatisfied with the plan from the local point of view and possibly from a broader point of view. Assuming that these objections could be brushed aside or overcome, which is a somewhat rash assumption, apparently nothing more could be done as the law stands at present.

Senator Cummins, chairman of Interstate Commerce Committee of the Senate, together with Congressman Esch, now a member of the Interstate Commerce Commission, probably had more to do with the framing of the present act than anyone else, as well as all others who are interested in this problem, have come to the conclusion that additional legislation is needed for the purpose of bringing about the consolidation of the railroads into a limited number of systems.

A Legal Way Will Be Found

If there is no direct constitutional method of compelling consolidation, other ways must and probably can be found.

Many years ago it was thought impossible to deprive state banks of the right of issuing notes, but a law was enacted which requires such banks to pay a 10 per cent tax on their bank notes. This law was sustained by the Supreme Court in the famous case of Veazie Bank vs. Fenno and, of course, no such notes have been issued since. The court said at that time "Congress may restrain by suitable enactments the circulation as money of any notes not issued under its own authority." It may be possible for the federal government to put a heavy tax on all railroads and to exempt companies incorporated under a federal charter. Possibly only companies incorporated under federal charters may become exempt from state regulations. Such a provision would surely be an inducement to the various state commissions to "soak" the companies. Many other ways may be devised which are perfectly legal and which will expedite consolidations.

Senator Cummins is reported to be desirous of introducing an amendment to the Transportation Act giving the companies seven years in which to bring about voluntary consolidation with provisions for compulsory consolidation at the expiration of that period. President Coolidge also declared himself strongly in favor of consolidation, and it may be taken for granted that this object will be accomplished sooner or later.

As stated, as the law stands at present, the plan which the commission will finally publish cannot accomplish the desired result, but it will greatly serve to crystalize public opinion on the whole subject. As usual, in the end, intelligent self-interest, especially when properly stimulated, will accomplish better results for the public and the security holders than an arbitrary government dictum.

The year 1923 was the first year of reasonably normal railroad operations since 1916. Unless there is a strike next April in the bituminous coal region, 1924 promises to be a

*Abstract of a lecture delivered at Princeton University on December 14, in the Department of Economics and Social Institutions.

fair year for the railroads. The officials of the strong companies can therefore get their bearings and be able to gage more accurately the advantages or disadvantages of absorbing any particular connecting carrier. On the other hand, the officials and security holders of the weaker companies, in view of the proposed time limit for voluntary consolidations, will be much more anxious to dispose of their properties on reasonable terms. We will, therefore, have a condition where a willing buyer and a willing seller will meet. This greatly facilitates business.

The Rich May Get Richer and the Poor Poorer

Everyone, especially those interested in railroad securities, is eager to know how consolidation will affect security holders. Probably it will work out as usual and according to the Bible "Unto everyone that hath shall be given and he shall have abundance, but from him that hath not shall be taken away even that which he hath." A strong company with comparatively small mileage, originating a large amount of tonnage will undoubtedly find that several of the larger carriers will be anxious to acquire its property; therefore, competitive bidding for the securities or the leasing of such a company will develop. On the other hand, it will be very difficult to find a buyer for a line which originates little business and which has no promise of increasing traffic in the future. It will be clearly understood that if a strong carrier acquires the property of a weak one that the public previously served by the weak carrier is to hereafter get very much better transportation facilities. In many cases, no doubt, improved facilities will develop traffic not previously existing, but this does not follow in all cases.

This whole situation is largely a question of physical value of each separate property. No strong company is going to buy the property of a weak company unless it is known exactly to what extent the potential dividend paying capacity of the buyer is increased thereby.

The complete valuation of the property of the various railway companies has not been completed yet and probably will not be for several years. Many complex legal questions connected with the valuation will have to be passed on by the supreme court. Definite and adjudicated values for all the railways cannot reasonably be expected before 1928 at the earliest.

If there is to be a time limit for the voluntary and subsequently compulsory consolidation, such a time limit should in fairness to all parties commence to run from the date when valuation is completed and the ground for an intelligent financial survey is cleared.

How Consolidations May Work

It is extremely interesting to apply all these theories to a real situation. The status of the independent soft coal carriers in northwestern Pennsylvania and the western part of New York state will serve for this purpose, probably as well as any other example. There are four of these carriers, the Buffalo, Rochester & Pittsburgh, the Buffalo & Susquehanna, the Pittsburg, Shawmut & Northern and the Pittsburg & Shawmut. These two later roads were intended to be supplementary to each other but have been segregated. These four companies are essentially coal carriers. The bulk of their traffic consists of handling coal originating along their lines, but destined to points on connecting railways more or less distant. They all cross the two proposed new trunk lines from the west intended to reach New York by way of the Central of New Jersey. One of these lines is the proposed Baltimore & Ohio Short Line from Chicago and northern Ohio to New York City. The other new trunk line is to be part of the New York Central System. Both of these lines will naturally want to haul the greatest possible amount of soft coal to New York harbor. These conditions create additional incentive to acquire good coal feeders.

The Buffalo, Rochester & Pittsburgh is a fair example of a strong company—that is, this property through years of careful management has been put in excellent condition; it owns a large amount of equipment and furnishes a large amount of traffic to connecting lines. It could be used to excellent advantage by the New York Central System. It would be of equal advantage to the Erie, with which it now exchanges a very substantial volume of business. It would also furnish a very good connection for the Delaware, Lackawanna & Western, and it would be of very great value to the Baltimore & Ohio, especially in connection with the proposed new trunk line across northwestern Pennsylvania.

The New York Central might be willing to give its own stock now selling at a premium for that of the Buffalo, Rochester & Pittsburgh. If the Erie wants to acquire this road it would have to issue a bond bearing a high rate of interest in order to compete with the New York Central. This might properly be called poor financing. Verily, the curse of the poor is their poverty! It is difficult to escape from the vicious circle of poverty. Should the government step in and compel the stockholders of the Buffalo, Rochester & Pittsburgh to sell to the Erie when they can probably obtain a better price from the New York Central? Is it likely that the courts will permit this?

The Buffalo & Susquehanna, which was thoroughly reorganized about ten years ago, is also a good property, but not as highly developed as the Buffalo, Rochester & Pittsburgh.

The Pittsburg, Shawmut & Northern is a very peculiar property. It has been in the hands of receivers since 1905. Eighteen years of continuous receivership is probably the longest period of court administration in the United States, or elsewhere. This property carries a fair coal tonnage, but its grades are very bad, especially at the north end. It owns about 200 miles of railroad, and it is very doubtful whether anyone would desire to acquire this line except subject to the privilege of abandoning the northern half, which runs contrary to the present current of traffic and can probably never be made to pay; still it serves a number of communities which by the abandoning of the road would be greatly inconvenienced. It is the intent of the Transportation Act that all people get substantially equal transportation facilities commensurate with the amount of earnings to the proper needs of their territory. Are the people in the towns of Friendship, Angelica and Richburg, the three largest communities along this hopeless division, entitled to a continuance of service of this railroad, thereby depriving the security holders of what little equity they may have in the fairly productive southern division? Similar conditions prevail all over the country.

The Interstate Commerce Commission a year ago permitted the abandonment of the Chicago, Peoria & St. Louis, a 200-mile railway in Illinois. The local courts have thus far prevented the suspension of operation, and in the meanwhile the deficit accruing from such operation has absorbed substantially the entire equity of the first mortgage bondholders.

Bonds of Weak Roads

As at present the bonds of the weak companies are selling at prices to yield up to and even over 10 per cent. No doubt the first mortgage bonds of the weaker systems are a safer purchase than the shares of these companies because generally speaking it is doubtful whether the weak companies can in case of a sale obtain a price higher than their existing earning capacity capitalized on a 6 per cent basis. Companies which have a particularly promising future may, of course, fare better.

Another Problem

An extremely interesting example of the problem before the commission which has been looming large in the public

eye is the Central of New Jersey, desired by the New York Central and by the Baltimore & Ohio, and which the people of Philadelphia want allotted to an independent Philadelphia & Reading. The physical valuation of the Central of New Jersey has not been completed, but it is unquestionably very high. With the growth of New York this company has tremendous potentialities. Will the Interstate Commerce Commission permit the stockholders of the Central of New Jersey to put their property up at quasi auction and let it go to the highest bidder? This would appear to be mere justice to the stockholders, but if this is done the Central of New Jersey could probably be disposed of at a price substantially in excess of its physical value.

What can the commission do about this property anyway in order to serve these various interests? The New York Port Authority wants the valuable terminals, probably at a rental which will not be satisfactory to the company; the Baltimore & Ohio and the New York Central want the main line; the Reading wants the main line and branches. The local territory served by the line wants to acquire equal access to the ports of Philadelphia and New York. There is an equally just basis for all these claims. Possibly the commission may decide that the stock may be put into a holding company, giving the Reading, the Baltimore & Ohio and New York Central equal interests in this holding company, subject to the rights of the New York Port Authority to operate the terminals. Another way out might be merger of the Central of New Jersey with the Reading and a joint control of the latter by the New York Central and Baltimore & Ohio.

About twenty years ago there was a similar contest over the control of the Richmond, Fredericksburg & Potomac, which was finally settled by depositing a controlling interest with a holding company in which the contesting companies each acquired a one-sixth interest. This Fredericksburg road, however, is different from the Central of New Jersey because it has very little local business; it practically forms a bridge between Washington and Richmond.

The Case Before the Supreme Court

In the case of the Dayton, Goose Creek, a small railroad in Texas, the Interstate Commerce Commission prohibited the sale of the property, shortly after its construction was completed, to the New Orleans, Texas & Mexico at a price substantially in excess of its physical value. The case of the Dayton-Goose Creek is now before the Supreme Court as the contest case on the recapture clause of the Transportation Act. Are the owners of the Central of New Jersey to be similarly confined to the physical value of their property after owning and developing it for two generations?

The whole railroad consolidation problem is full of knotty questions for the I. C. C. to solve and for the courts to adjudicate—the New England problem is not the least of them. The public must be properly served and vested interests justly treated. It is necessary to hurry slowly.

THE FATAL COLLISION AT FORSYTH, N. Y., on December 9, was investigated by George E. Blood, coroner, coincidentally with the investigation made by the federal and state authorities, and the coroner announces that the railroad will be required to separate the grades of the railroad and highway, at the crossing where the collision occurred, the verdict at the same time recommending that, until this is done, watchmen be stationed at the crossing throughout the 24 hours of every day. An order for constant attendance of watchmen had already been issued by the Public Service Commission. The coroner does not hold any person criminally responsible. The New York, Chicago & St. Louis runs parallel to the New York Central at this point, and the crossing orders call for action by both railroads.

Building and Loan Associations on the Pennsylvania System

By C. P. Brady*

THE old adage, "Necessity is the mother of invention," is exemplified by the way in which employees of the Pennsylvania Railroad are solving the problem of finding suitable homes. The shortage of houses, soaring rents and the difficulty of getting money with which to buy or build caused a number of the employees of the Pennsylvania Railroad to organize local building and loan associations from which they could secure the necessary financial assistance.

In March, 1922, a number of employees in the general offices of the Pennsylvania Railroad, at Philadelphia, organized the "Broad Building and Loan Association," all of the officers and directors of which (with the exception of the solicitor) are life-long employees of the road. They are all men who are well known and have the confidence of their associates. This association started out with a total of 1,859 shares. It is now 22 months old, and has a total of 4,300 shares. It is estimated that by the end of its second fiscal year, March, 1924, it will show assets of $100,000.

While this association was formed and is managed by Pennsylvania employees, its membership can and does include persons not connected with the railroad company, although it was organized primarily to take care of the needs of the employees. In the short period of its existence, the Broad Building and Loan Association has made 36 mortgage loans, 31 of which were to employees.

The Pennarr (Penna. R. R.) Endowment Building and Loan Association has been in existence since February, 1920. On its opening night it had 2,400 shares subscribed, and at present has 7,000 active shares, 90 per cent of which are held by employees of the Philadelphia Terminal Division, with $175,000 invested in mortgage loans to these employees. All of the officers and directors, except the solicitor and his assistant, are employees of the Pennsylvania.

The Penn System Building and Loan Association was organized June 27, 1923, by employees of the general offices of the Pennsylvania Railroad at Pittsburgh. It started with 669 shares and now has a total of 1,352 shares in the association. All the organizers are employees of the Pennsylvania Railroad System.

The P. R. R. Y. M. C. A. Building and Loan Association of Jersey City has 6,500 shares outstanding, and assets of $300,000, and the association has been in existence only slightly in excess of four years. Like the other three, practically all of the officers and directors of this association are employees of the Pennsylvania Railroad System.

The management of the Pennsylvania Railroad has nothing whatever to do with these organizations, but, of course, has encouraged their formation, some of the officers being stockholders and others borrowers as well. However, recognizing the need for managerial assistance along these lines, the management and the employees of the Pennsylvania Railroad System within the past few months organized what is known as the Employees' Provident & Loan Association. Employees of the road may place their savings in this association by direct payment to an agent of the association or by deductions from the payroll. They may secure first mortgage loans on real estate, and in addition there are the following features: Purchase of securities of the Pennsylvania Railroad or its subsidiaries; pension in addition to that provided by the company; and emergency loans.

Beyond a doubt, these associations are helping P. R. R.

* Mr. Brady is chief clerk to the vice-president in charge of personnel of the Pennsylvania Railway System and secretary of the Broad Building & Loan Association, Philadelphia.

employees to systematically save a portion of their salaries and to own their homes. Nowadays it is unfashionable to pay rent—and a waste of money. Every man has an inherent desire to own his home. Building associations have done more to satisfy that desire than any other agency.

Industrial establishments of all kinds are encouraging the promotion of building and loan activities among their employees, because it can readily be seen that when a man starts buying a home through a building association he sticks to his job, and this has a decided effect on keeping the labor turnover at a minimum. Comparatively few houses are bought and paid for without the aid of building associations, and if the activities of the latter were to be curtailed by adverse legislation, building activities would have to diminish proportionately, and the housing shortage would become more acute.

The first building association in this country was established in Philadelphia in 1831. It is not surprising therefore that Philadelphia has come to be known as the "City of Homes." Building associations are chartered by the state and their books and securities scrutinized periodically by the state banking department. Building associations are operated on purely mutual lines, earnings being apportioned on the basis of the number of shares held. As a rule, the only paid officers are the secretary and treasurer, and they usually receive but nominal sums for their services. The directors (who must be stockholders) give their time and help gratis, and, naturally, must be enthusiastic in the work or they would not accept this responsibility. They have managed so well that a building and loan association failure is extremely rare. The directors are elected once a year by the stockholders.

As a means of saving, building associations afford a safe, convenient and remunerative method for the salaried man that is unsurpassed. In the Magazine of Wall Street for October 27, page 1189, appears a table of "Representative Security Lists," and List No. 1, which represents the highest type of investment in point of safety, is composed of the following: Savings banks; building and loan associations, and U. S. Treasury Certificates.

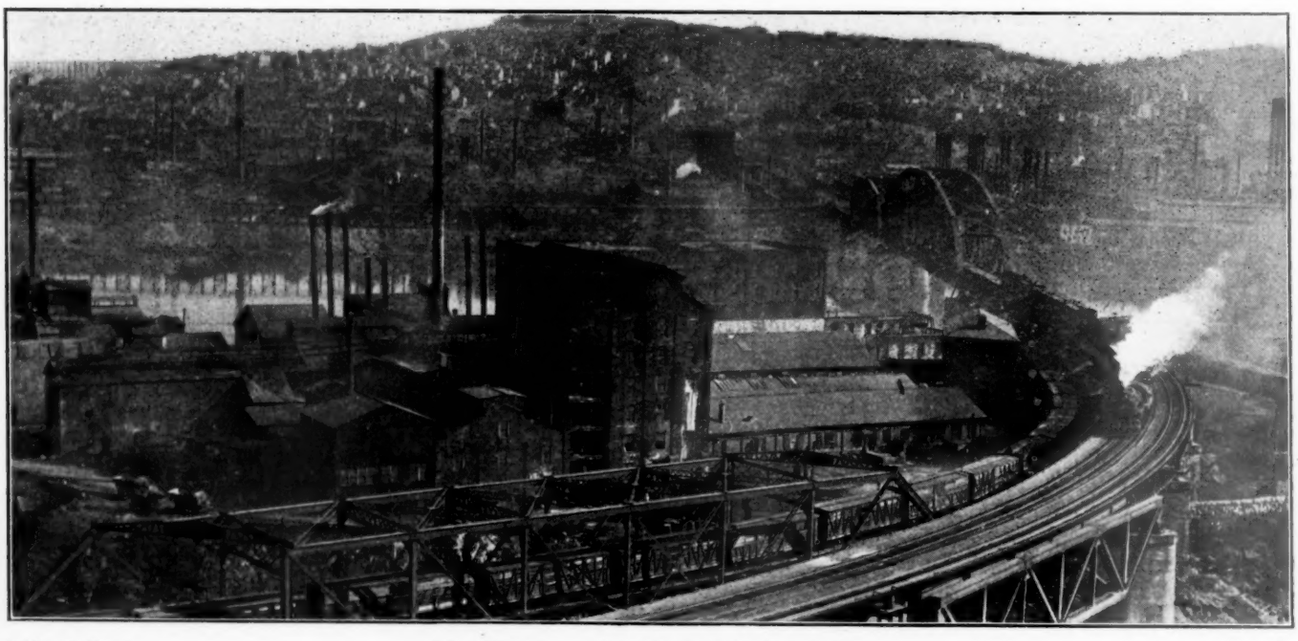
The returns from building and loan associations are much greater than from either of the other two. Five dollars placed in a building association every month for 11 years, or a total of $660, will return $1,000. Five dollars per month placed in a saving fund for the same length of time, and interest allowed at 4 per cent compounded annually, will return $826.71. In the case of the building and loan association there is a profit of $340; in the case of the savings bank there is a profit of about $167.

The federal income tax law allows an exemption up to $300 on building and loan profits. As an illustration: When five shares of building and loan stock mature, $1,000 is paid the owner of the stock. He may have actually paid to the association $60 a year for 11 years, or a total of $660, leaving him a profit of $340. As the law allows an exemption of $300, he would only have to pay a tax on $40.

Building and loan associations enhance their profits by borrowing money (usually from banks and trust companies) at less than 6 per cent, and loaning it at a slight increase. The laws of the State of Pennsylvania permit building and loan associations to borrow up to 25 per cent of the withdrawal value of the shares outstanding. And credit is due the banking institutions for co-operating to a very large extent with building and loan associations. Without this co-operation, building associations could not flourish, since by utilizing this borrowing capacity they are able to show increased earnings, which attracts new stockholders, and this means more money to loan. The more money there is to loan, the more home-buyers.

The total assets of building and loan associations in the United States have passed the huge figure of three and one-quarter billion dollars. With respect to the number of associations, Pennsylvania leads all the other states with 3,316 organizations, 2,240 of which are in the city of Philadelphia. During the year 1922 there were 51,153 homes bought or purchased through the assistance of building and loan associations in the State of Pennsylvania.

There are seven million members of building and loan associations in the United States. There ought to be seventy millions, and there will be as fast as people become educated to the advantages of membership. The gain in membership last year was 18 per cent. These statistics are indicative of the popularity of building and loan associations as a means of saving and borrowing money. The League of Building and Loan Associations has adopted for its slogan—"The American home, the safeguard of American liberties."



Ewing Galloway

The Baltimore & Ohio in Pittsburgh, Pa.

Equipment Maintenance Out of Proportion

Particularly in 1923 Due to Strike Costs and Progress in A. R. A. Program. Relief Expected in Near Future

A DISTINGUISHING FEATURE of the figures of railway gross and net for the past several months has been the large amount charged to the maintenance expenses accounts. Just how large these charges have been is best indicated by the fact that the charges to maintenance of way and to maintenance of equipment alike have been larger in the first nine months of 1923 than those for any other similar nine months' period in railway history with the single exception of the first nine months of 1920, which period was characterized by most peculiar conditions. The charges to maintenance of equipment have been particularly heavy. In the first nine months of 1923, for example, maintenance of equipment expenses showed an increase of no less than 23.7 per cent as compared with the first nine months of last year, whereas the increase in total operating revenues has been 17.6 per cent, that of total operating expenses 15.1 per cent, and in the transportation expense account 13.1 per cent. The increase in maintenance of way expenses for the same period was 11.1 per cent.

It is important to determine the underlying reason for this heavy maintenance expense. It is particularly desirable to know whether it represents a normal or an abnormal condition. The railways earned in the first nine months of this year a net equivalent to only 5.27 per cent on their tentative valuation, notwithstanding the fact that during that period they moved more ton-miles than in any other January to September period in their history. It would be of great value to know whether it might have been the heavy maintenance costs which prevented the net from being larger than it actually was or prevented it from reaching the 5¾ per cent which the Interstate Commerce Commission has determined to be a reasonable rate of return. Maintenance costs are normally larger in a period of prosperity than in one of reduced earnings. Are the present heavy maintenance costs due to that factor alone or are there other factors involved? If the latter, will they continue to apply in a succeeding period of less gross or net income?

Analysis Develops Optimistic View

Analysis of the figures will develop, we believe, optimistic rather than pessimistic views as to future trends. That is to say, the analysis points to lower maintenance costs in the future than prevail at present. In the study which has been conducted, the attempt has been made to compare the present levels of maintenance costs with those existing prior to the war, the analysis extending as far back as 1921. Special attention has been given to the 1923 figures with a view to determining their relationship to the post-war situation.

It was, of course, developed at the start that railway maintenance costs in the post-war period were on a much higher level than prior to the war and that there had been, even prior to the war, a tendency of the costs to rise year by year, which tendency was exaggerated by the conditions of the war period. Under the circumstances there was little to be learned, it was felt, from the actual increase in the figures or the actual rise in the maintenance cost level. The important factor was the relative increase as compared with such factors as railway operating revenues, the cost of conducting transportation, total operating expenses, etc. The facts developed were that the increase in maintenance costs was relatively greater than were the increases in comparable factors. It was then further developed, that the increase was greater in maintenance of equipment than in maintenance of way. In fact, even though maintenance of way expenses in the first nine months of 1923 were greater, with the exception of 1920, than those for any other similar nine months' period in American railway history, the ratio of maintenance of way expenses to total operating revenues in 1923 has been no greater than it was in such years as 1910, 1911 or 1912. The proportion of maintenance of way expenses to total railway operating expenses in the first nine months of 1923 was actually less than it was in 1910 or 1911.

The situation as to the increase in maintenance of equipment expenses has been entirely different from that applying to maintenance of way. The ratio of maintenance of equip-

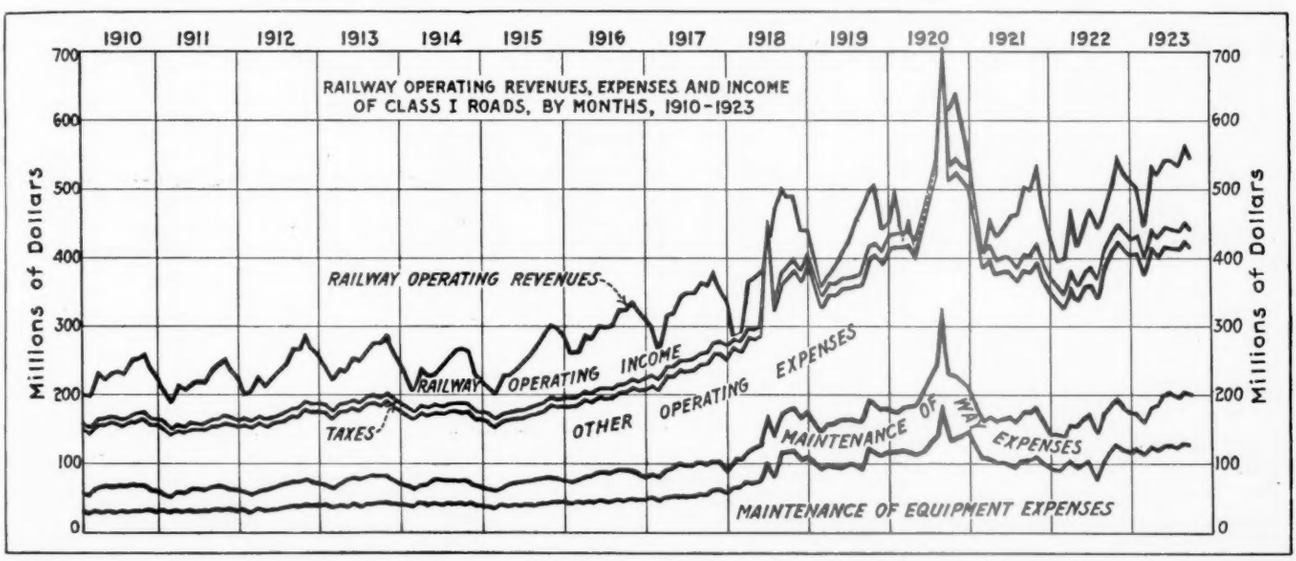


Fig. 1

ment expenses to total operating revenues and to total operating expenses alike had shown a steady tendency to increase in the years prior to the war. The increase was further exaggerated during the war and the period of federal control and it has not been counteracted since. It remains high in 1923 and the evidence is plain enough that the maintenance of equipment expenses have now moved up to an entirely new and much higher relative level. Fortunately—as concerns the future—a special condition rules in 1923. The 1923 maintenance of equipment expenses, it develops, have been abnormally high as compared with the other years of the post-war period. They reflect in that respect the costs of the shopmen's strike. The railways this year have devoted special attention to the condition of their cars and locomotives, as a result of which their equipment is now in the best shape it has been in for a period of years. To accomplish this result cost money. It is to be presumed that henceforth there will be a lessening of maintenance of equipment costs. It is not likely that there can be a restoration to pre-war ratios of maintenance of equipment costs but the improvement in the situation should be substantial notwithstanding.

Manner of Analysis

Three methods were followed in pursuing the analysis. The first was in the form of a direct comparison of the various maintenance ratios by months from January, 1910, to August, 1923. The second embodied a comparison of the situation as it existed in the pre-war period with the situation as it existed in the post-war period. The two periods taken were 1911 to 1914 and 1919 to 1922, respectively. The comparison was effected by striking off an annual average for each period and by observing the relation of the percentage increases of the various items of railway revenues and expenses selected. The third method embodied a comparison of the figures for the first nine months of 1923, with an average for the similar nine-month periods of 1919 to 1922. The object of this third comparison was to determine whether the 1923 figures were in line with those for the post-war period generally. Every comparison made showed that the maintenance of equipment expenses had increased abnormally as compared with such other factors as total operating revenues, transportation expenses and total operating expenses over the period 1910 to 1923 taken as a whole; in the period of 1919 to 1922 as compared with the period 1911 to 1914, and in the first nine months of 1923 as compared with the average for the nine-month periods 1919 to 1922, inclusive.

It is surprising to see how much information as to the long-time trend of railway maintenance costs can be secured from a study of the monthly figures of railway gross and net. Such monthly figures have not previously been readily available. However, the Interstate Commerce Commission has prepared such a compilation which it has included in its recently issued 35th annual report on the statistics of the railways in the United States. The compilation which appears on pages xcix and c of that document shows the figures by months for the year 1910 to 1922. It includes those for total operating revenues, total operating expenses, railway operating income and for maintenance costs, the latter being shown for maintenance of way, for maintenance of equipment and for the two combined.

The three charts shown in this article have been prepared from this compilation of monthly figures. The chart in Fig. I is plotted from the actual figures; it is an adaptation of a chart which the commission presents in its own statistical report. The other two charts show ratios. Fig. II shows the maintenance costs in the form of the maintenance ratios, in other words as percentages of the total operating revenues. In Fig. III the points show percentages of maintenance costs to total operating expenses.

The information to be obtained from Fig. I is not as complete or as instructive as that which can be obtained from the other two charts. The chart indicates clearly enough the gradual increase in railway costs over the period covered and it is readily to be seen how the basis of things was entirely upset by the war and the period of federal control, upset to an extent so great that in many of the months shown the symbol for railway operating income does not appear on the chart at all.

The Maintenance Ratios Charted

What we are interested in, however, is to determine the relationship between the increase in railway costs and that in railway income. We desire to ascertain if the increase in maintenance costs has been accompanied by a corresponding increase in the railway gross income. Study of Fig. II will readily indicate that the increase in maintenance costs has been out of proportion. It will indicate also, however, that this result is due to disproportionately increased maintenance of equipment costs and that, on the other hand, the increase in costs of maintenance of way has not been undue. Thus, the chart shows that in such early years as 1910, 1911 or 1912 the ratio of total maintenance expenses to total operating revenues varied between 26 and 30. During the federal control and guaranty periods it had a wider range—between 29 and 46—and due to a special circumstance actually reached in August, 1920, a figure of no less than 59. In that month an advance in wages retroactive to May 1 was included. In the more recent years, 1921 to 1923, it has been reduced to a range between 33 and 40. Roughly speaking, in the last three years it has ranged not far from 8 points higher than it ranged in 1910, 1911 or 1912. That the increase in the ratio is due to increased maintenance of equipment costs is apparent from the curve of the monthly maintenance of equipment ratio. Thus in 1910 or 1911, the maintenance of equipment ratio ran about 15 or slightly over. The curve shows a continuing upward trend from these years until the federal control period is reached, when the points are at a higher range and show greater variation. In recent months the ratio has ranged between 20 and 25 except for July, 1922, when the idleness of the repair shops due to the employees' strike brought it down to 18. The maintenance of equipment ratio in the last three years has reached a level which is, like the ratio of total maintenance expenses, about 8 points higher than it was in 1910 or 1911. The curve of the maintenance of way ratios is extremely interesting. It has not shown an upward trend even in a period extending over 14 years. Ranging between 10 and 15 for the past three years, it is about the same as it was in 1910 or 1911. In 1915, 1916 and 1917, it actually showed a tendency to decline, which tendency was, of course, counteracted during the federal control and guaranty periods. Judged on a ratio basis, the heavy maintenance of way expenses of the past few months do not seem to have been excessive in any way. If that statement is correct, it is conversely the implication that maintenance of equipment expenses may have been extraordinary.

Proportion of Total Operating Expenses

Fig. III amplifies Fig. II. It shows the monthly figures plotted on the basis of the ratio to total operating expense. Its purpose is to enable one to ascertain whether maintenance costs now take up a larger proportion of total operating costs than was the case in former years. It is readily apparent that they do. It might have been interesting to effect a comparison between maintenance expenses and transportation expenses; such a comparison would have shown that the ratio of maintenance to transportation is higher now than it used to be. In effect, that is implied from the results derived in the working out of the ratios of maintenance expenses to total operating expenses plotted in the chart. Like

Fig. II, Fig. III indicates the more than proportionate increase in maintenance expenses over a long period of years. The chart bears out Fig. II likewise in showing that the increase has been in maintenance of equipment, the monthly ratios of which to total operating expenses have shown an even upward trend throughout the whole period. That the increase in maintenance of way costs has not been undue is again readily evident as it was in Fig. II.

Some remarks may be desirable concerning the use of the ratios of maintenance costs to total operating revenues or to total operating expenses. Some observers believe that the use of maintenance ratios has had its limitations in recent years because of the varying value of the dollar. This criticism is correct and pertinent. It would apply as to various uses which have been made of maintenance ratios, particularly, as might be instanced in the case of efforts made to indicate the amount of maintenance work done by means of a comparison of maintenance ratios at different times. This criticism does not seem to apply to this study. We are in reality trying to effect a comparison of the relative value of the railway maintenance dollar with that of the railway revenue dollar or a comparison of the railway maintenance of equipment dollar with the total railway expense dollar. That is not all, however, because we are also interested in the comparative amount of work done and there may also be other factors. It is the final effect that we are seeking which is to ascertain whether railway maintenance is costing the railways relatively more than used to be the case and in addition such facts as may be corollary thereto. The reader does not need to be told that due recognizance is had of the fact that in a ratio of expenses to revenues the ratio will vary with the volume of revenues as well as with the amount of expenses. This factor is taken care of in the recognition of the fact that we are working with averages and trends and have not been particularly interested in figures applying to individual months in which revenues or expenses may be high or low, depending upon the seasonal variations, business conditions or special factors which may apply.

A Comparison of Post-War and Pre-War Periods

The second part of the analysis is a comparison of the figures for a selected post-war period with those for a selected pre-war period. The pre-war period selected was the years 1911 to 1914. The post-war period 1919 to 1922. Comparison was effected by means of averages, the average of the four years of the selected pre-war period being compared with the average of the four years of the selected post-war period. The result of this comparison was to show percentage increases as follows for the latter period over the figures for the earlier period:

	Percent increase average for years 1919-1922 over average for years 1911-1914
Revenue ton-miles	30.5
Total operating revenues	96
Maintenance of way expenses	121.9
Maintenance of equipment expenses	128.5
Traffic expenses	22
Transportation expenses	123.2
To al operating expenses	124.0

The striking feature in this comparison is the increase of 128.5 per cent in maintenance of equipment expenses, the largest percentage of increase shown in the tabulation. It compares with increases of 121.9 in transportation expenses and of 124 per cent in total operating expenses. This means that the increase in maintenance of equipment costs in the post-war period as compared with the pre-war period was out of proportion to the other factors and bears out our previous conclusions to the same effect. The increase of 96 per cent in total operating revenues, occurring with an increase of only 30.5 per cent in revenue ton-miles, reflects the effect of the increased rate level. The fact that the increase of 96 per cent in revenues compared with an increase

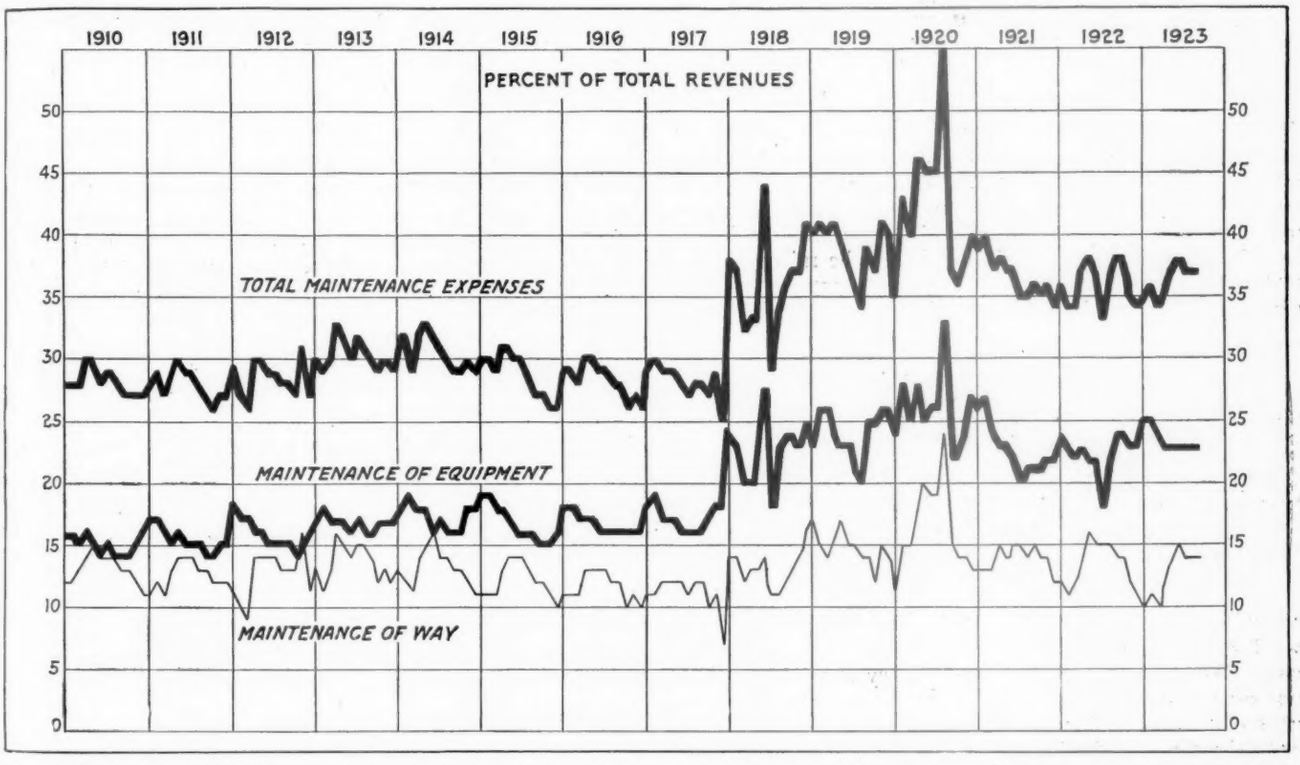


Fig. 2—Relation of Maintenance Costs to Total Operating Revenues Shown by Months from January, 1910, to September, 1923

of 124 in expenses indicates what we already know to the effect that the increase in rates in the federal control and succeeding periods was not sufficient to compensate for the abnormally expanded costs of operation which resulted from the war and the things which were done during the regime of the Railroad Administration. It is admitted, of course, that the four years 1919 to 1922, inclusive, selected for the post-war period were all very abnormal years as follows naturally from the fact that railway history generally since the war has been abnormal. It is only in 1923, which is not included in this particular comparison, that we have finally had a return to conditions that can be regarded as approaching normal.

1923 Compared with Post-War Period

We bring 1923 into our comparisons by the next step in our analysis. This step is a comparison of the figures for the first nine months of 1923 with those for the comparable nine months' periods of the four preceding years. The nine months' period is selected because at the time this is written the latest 1923 figures of revenues and expenses available are those of September and the nine months' cumulative. In this comparison we bear in mind that the railway traffic of the first nine months of 1923 was the greatest for any nine months' period in the history of the American railways.

Revenues and Expenses Selected Post-War Period Years 1919 to 1922, Inclusive, Compared with Selected Pre-War Period 1911 to 1914, Inclusive

Year	Mileage	Revenue ton-miles (000)	Total revenues	Maintenance way and structures	Maintenance equipment	Traffic	Transportation	Total
1911	215,146	249,843,166	2,692,518,403	348,004,080	415,590,400	57,462,938	954,349,616	1,844,065,958
1912	218,134	259,981,628	2,744,342,277	348,470,704	436,995,458	59,047,064	984,852,159	1,898,662,465
1913	222,745	297,722,528	3,043,324,782	405,840,494	499,914,820	61,427,558	1,067,674,603	2,108,947,614
1914	225,445	284,924,749	2,969,898,838	403,682,593	520,200,274	62,366,351	1,073,981,380	2,139,755,988
Average	220,368	273,118,018	2,862,521,075	376,499,468	468,175,238	60,075,977	1,020,214,440	1,997,858,006
1919	231,990	364,293,063	5,144,795,154	771,416,094	1,224,112,789	47,450,487	2,156,615,413	4,378,285,227
1920	234,668	410,306,209	6,178,120,978	1,032,540,381	1,590,364,640	74,530,997	2,891,662,486	5,830,620,492
1921	234,419	369,997,353	5,516,598,242	756,413,690	1,251,479,443	84,183,424	2,252,090,903	4,562,668,302
1922	233,850	339,730,198	5,617,252,656	735,700,633	1,259,664,875	86,694,504	2,174,932,887	4,455,650,216
Average	233,732	356,081,706	5,614,191,758	824,017,700	1,331,405,187	73,214,853	2,368,825,422	4,806,806,059
Per cent of increase	.....	30.5	96	121.9	128.5	22.0	123.2	124.0

Revenues and Expenses for First Nine Months of 1923 Compared with Average of Nine Months' Periods 1919 to 1922

Year	Mileage	Net ton-miles (000)	Total revenues	Maintenance way and structures	Maintenance equipment	Traffic	Transportation	Total
1919	234,069	290,033,834	3,780,780,145	574,908,182	887,160,290	34,871,635	1,587,003,299	3,207,376,487
1920	234,221	334,013,553	4,440,992,579	787,432,175	1,163,804,441	52,649,319	2,102,951,343	4,276,883,353
1921	234,811	252,663,944	4,137,354,662	579,275,431	945,168,064	63,516,478	1,734,737,815	3,483,124,014
1922	235,232	262,016,429	4,029,797,534	547,885,294	893,894,517	64,568,193	1,561,063,088	3,215,560,216
Average	234,583	284,681,940	4,097,231,230	622,375,271	972,506,828	53,901,406	1,746,438,886	3,545,736,018
1923	235,736	343,796,799	4,742,797,812	609,265,914	1,106,136,799	69,525,010	1,766,999,167	3,703,346,445
Per cent of increase	.....	20.8	15.7	dec. 2.0	13.8	29	1 2	4.4

Revenues and expenses reflects 1923 railway efficiency—the efficiency that enabled the railways this year to handle an enormous business without car shortage or congestion. The increase of only 4.4 per cent in total operating expenses with an increase of 15.7 per cent in total operating revenues explains why it is that in the first nine months of 1923, the railways earned 5.27 per cent on their tentative valuation, whereas in the first nine months of 1920 they had a deficit, and whereas the return on the valuation in the first nine months of 1921 was on an annual basis but 3.00 per cent and in the same period of 1922, 3.96 per cent.

We must also realize that this traffic was handled with unusual efficiency and, therefore, presumably at reasonable costs. What do the figures show? They show that in the first nine months of 1923, there have been increases or decreases as compared with an average for the first nine months' periods of the four preceding years 1919 to 1922 as follows:

	First nine months of 1923 compared with average for nine months' periods of 1919 to 1922, inclusive
Net ton-miles	20.8 per cent increase
Total operating revenues	15.7 per cent increase
Maintenance of way expenses	2.0 per cent decrease
Maintenance of equipment expenses	13.8 per cent increase
Transportation expenses	1.2 per cent increase
Total operating expenses	4.4 per cent increase

This comparison of nine months' periods is, if anything, more striking than that above shown for the selected post-war period as compared with the selected pre-war period. The feature of the comparison is again the disproportionate increase in maintenance of equipment expenses, particularly as contrasted with an actual decrease in expenses for maintenance of way. Maintenance of equipment expenses in the four years 1919 to 1922 were abnormal. That in the first nine months of 1923 they should have been even 13.8 per cent higher still must be indicative of several important factors. With reference to the comparison of the nine months' periods, one notes the increase of 20.8 per cent in net ton-miles resulting from the fact that in the first nine months of 1923 the railways handled the largest traffic for any such first nine months' period in their history. The somewhat smaller increase of 15.7 per cent in total operating revenues results from a slightly lower rate level dating back to the decreases in rates in 1922. The decrease of 2.0 per cent in maintenance of way expenses bears out previous statements in this article to the effect that the increase in maintenance of way costs has not been out of proportion. The increase of only 1.2 per cent in transportation costs with an increase of 20.8 per

The Disproportionate Increase in Equipment Maintenance Expenses

We now have before us two important facts. One is that over a long period of years there was a continuing and disproportionate increase in railway maintenance of equipment costs which trend was particularly exaggerated by the conditions arising out of the war and federal control. The other is that in 1923 maintenance of equipment expenses have shown a continuing abnormal increase which marks a further substantial rise over the already abnormal level of the selected post-war period.

The explanation of the disproportionate increase in equipment maintenance expenses in the post-war period as compared with the pre-war period or of the rising trend evidenced for the entire period since 1910, could well be made

the subject of extended analysis. Fortunately, we have already in this article sufficient facts to permit of our drawing definite conclusions without having to wait on the results of more elaborate investigations. Briefly, one might explain the reason for the disproportionate increase in maintenance costs—we speak now of the long-term trend—presumably in such factors as depreciation and in the varying wage scales. Possibly something might be brought out as to the relative efficiency of the mechanical department with particular reference to the many things that are lacking as to railway shop efficiency. The factor of depreciation charges would apply because the charges to depreciation of cars and locomotives are possibly disproportionate as compared with such charges for roadway, buildings, etc. The increase in wages in the mechanical department has been relatively greater than in most other departments.

The most important fact brought out in this article is the one to the effect that in the first nine months of 1923 maintenance of equipment costs were 13.8 per cent greater than the average for the comparable nine months' periods of the years 1919 to 1922, inclusive. It is not difficult to find the reason for this abnormal advance over an already high maintenance of equipment cost level. The reason, of course, is that the heavy maintenance of equipment charges thus far in 1923 represent the cost of overcoming the shopmen's strike of last year and the cost embodied in bringing the railway equipment situation up to the standard desired by the A. R. A. 1923 transportation program. We may go back to the condition existing at the end of federal control or to the guaranty period when cars were returning to the owner roads in bad order and locomotive maintenance conditions were not favorable. Part of the excessive maintenance of equipment costs of 1920, 1921 and the early part of of 1922 were due to the efforts made to remedy this condition. As heavy as the costs were, however, the remedy was by no means effective. On July 1, 1922, for example, when the railway shopmen's strike began, the percentage of bad order cars was 14.9 and of locomotives held for repairs requiring over 24 hours 17.6. On June 1, 1922, the latter figure was 19.5, the trend towards improvement was reversed by the shopmen's strike, the effect of which, however, had begun to be counteracted by the end of the year.

Reasons Suggested for 1923 Costs

As a result the carriers started 1923 with a percentage of bad order cars on January 1, of 9.5 and with 21.1 per cent of their locomotives held for repairs requiring over 24 hours. From that time on there was steady and continuing improvement. On October 1, 1923, the bad order car percentage was 6.7. With only 13.7 per cent of their locomotives held for heavy repairs the railways had bettered the mark of 15 set by the A. R. A. transportation program. On October 1 the number of locomotives unserviceable was the smallest it has been for many years, and conversely, the number of serviceable locomotives, the largest reported since the compilation of the figures was begun. The excellent condition of the motive power during the past several months has unquestionably done as much as any other thing to permit the roads to handle the heavy 1923 traffic as well as they have.

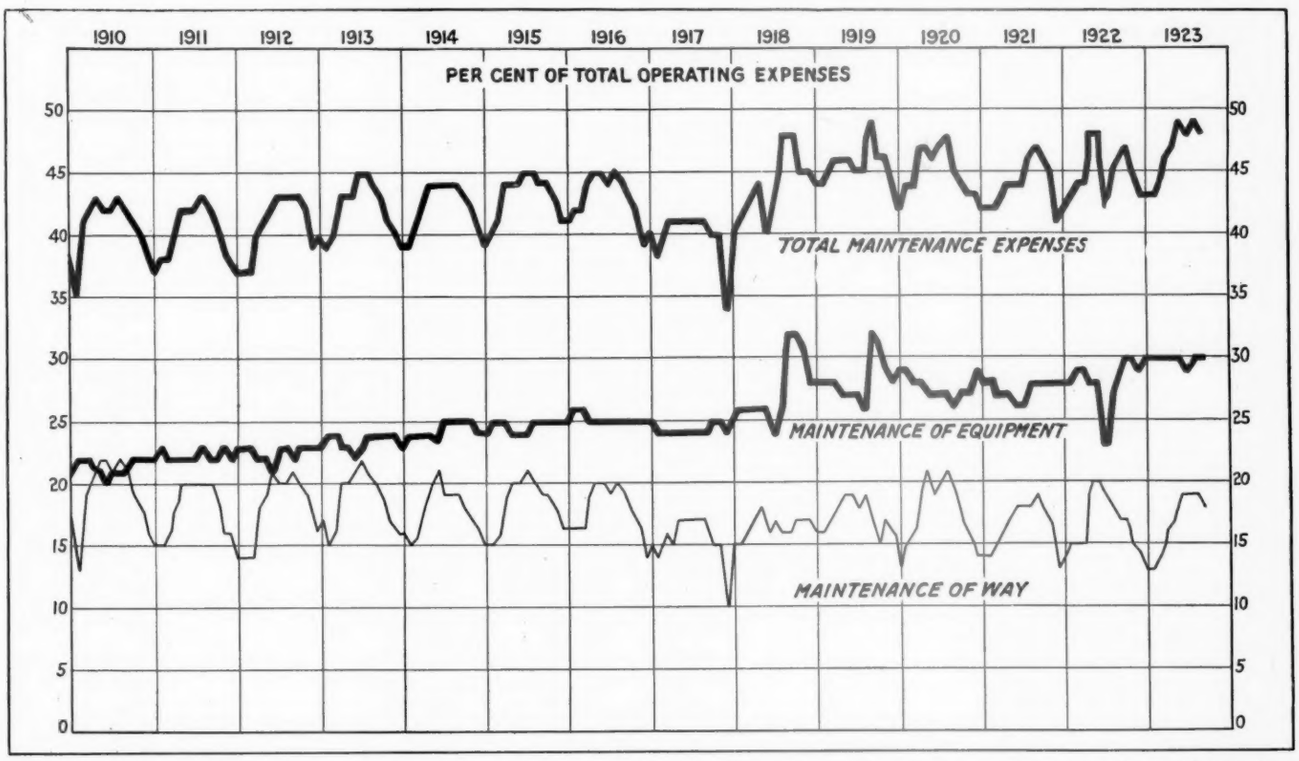


Fig. 3—Relation of Maintenance Costs to Total Operating Expenses Shown by Months from January, 1910, to September, 1923

An Estimate of the Abnormal 1923 Cost

However, to effect the remarkable improvement in equipment condition which has been brought about has cost money. It may be properly said then the work which has been carried on in the shops to accomplish the excellent transportation results which have been secured has been the primary reason for the abnormal expansion of maintenance of equipment costs in 1923. Similarly it follows now that the work is done that maintenance of equipment expenses should henceforth be reduced. The question is as to how much they will be reduced. They will unquestionably be lowered to an amount which will put them on a parity with the 1919-1922 level and possibly below that level.

It would be valuable were it possible to estimate the ab-

normal increase which has taken place in 1923 as a result of the cost of accomplishing what was desired in the A. R. A. transportation program and what was necessary to permit the railways' 1923 efficiency of operation. Maintenance of equipment expenses in the first nine months of 1923 totaled $1,106,136,799. To effect our comparisons, we are going to relate this to the total operating revenues, total operating expenses, to the operating expenses other than maintenance of equipment expenses, and also to transportation expenses with a view to establishing some sort of an index of the size of the maintenance figure as related to other railway operating factors. Thus we find that the 1923 first nine months' maintenance of equipment figure of $1,106,136,799 was:

23.3 per cent of the total operating revenues of the same period.
29.9 per cent of the total operating expenses.
42.6 per cent of the total operating expenses exclusive of equipment, and
62.6 per cent of the transportation expenses.

We are effecting our comparison with the figures for the first nine months' periods of 1919 to 1922. The average of the maintenance of equipment expenses in these periods was $972,506,828. This compared as follows with the other averages of the same nine months' periods. It was:

23.7 per cent of the average of total operating revenues.
27.4 per cent of the total operating expenses.
37.8 per cent of the total operating expenses less maintenance of equipment expenses, and
55.6 per cent of the transportation expenses.

Of special interest is the per cent given of transportation expenses. Maintenance of equipment expenses in the first nine months of 1923 were 62.6 per cent of transportation expenses. The average for the nine months' periods of 1919 to 1923 shows a figure of 55.6. The average for the four full years 1919-1922, selected above as our post-war period, was 56.6. For the selected pre-war period, 1911-1914, it was only 45.9.

PER CENT OF TRANSPORTATION EXPENSES

	Maintenance of equipment	Maintenance of way
1911-1914 annual average	45.9	37.6
1919-1922 annual average	56.6	34.8
1919-1922 average for first 9 months' periods	55.6	35.6
1923 first 9 months	62.6	34.5

It would be of interest to apply to the 1923 first nine months' equipment maintenance figure the same per cents as ruled in the comparable periods of 1919 to 1922 averaged. Results like this would follow:

If the figure of maintenance of equipment expenses had been 23.7 per cent of total operating revenues instead of the 23.3 which it actually was in the first nine months of 1923, the figure would have been approximately $1,128,000,000.

If it had been 27.4 per cent of total operating expenses instead of 29.9 per cent, which it actually was, the figure for the nine months would have been approximately $1,014,500,000.

If it had been 37.8 per cent of the total operating expenses, exclusive of maintenance of equipment expenses, instead of the 42.6 per cent which it actually was, the figure for the nine months would have been approximately $982,000,000.

If it had been 55.6 per cent of transportation expenses, instead of the 62.6 which it actually was, the figure would have been, roughly, $982,000,000.

The first figure of per cent of total operating revenues we may disregard because if we do not we fail to heed that railway expenses do not increase, other things being equal, in proportion to increase in traffic volume.

We have in the second figure—per cent of total operating expenses—a better index than the first, but even this suffers to some extent because the total of operating expenses includes the very figure of maintenance of equipment expenses which we are seeking to analyze.

This is the reason for working out the third calculation—per cent of maintenance of equipment expenses to total operating expenses exclusive of the maintenance of equipment costs. The figure which we have derived in this case is $982,000,000. It is of special interest that this happens to coincide exactly with the figure worked out on the basis of the percentage of maintenance of equipment costs to transportation expenses. That the two figures agree is in a measure a check of the method used and of the calculations; it reflects also that the maintenance of way costs, an important factor in the third calculation, have changed fairly closely in proportion to the other factors involved. Using then our derived figure of $982,000,000 as representing what the maintenance of equipment costs would have been in the first nine months of 1923 had it not been for abnormal factors, the next step is to compare it with the actual figure. As already noted, the actual figure for maintenance of equipment costs in the first nine months of 1923 was $1,106,136,799. Our compiled or theoretical figure of $982,000,000 based on the ratios is approximately $124,000,000 less.

Room is offered from this point on for interesting surmise, and the reader may determine whether the surmise is profitable or not. Thus it follows that if the maintenance of equipment expenses in the first nine months of 1923 had been $124,000,000 less than they actually were, net operating income would have perforce been $124,000,000 greater than it actually was. The net operating income for the first nine months of 1923 was $718,948,600, equivalent on an annual basis to 5.27 per cent on the carriers' tentative valuation. If that amount had been $124,000,000 greater it would have become roughly $843,000,000, and that would have been equivalent on an annual basis to no less than 6.18 per cent on the carriers' tentative valuation. Some will be so severe as to state that the amount of $124,000,000 is excessive maintenance. What it actually represents is maintenance that was deferred. The work should properly have been done in 1922, even in 1921 or 1920, and if it had been done then, net in those years would have been reduced accordingly. The carriers earned in 1919 only 2.46 on their tentative valuation; in 1920 but 0.32 per cent; in 1921 but 3.33 per cent, and in 1922 but 4.14 per cent. Put in simpler terms, it was in great degree part of the cost of the shopmen's strike. That strike occurred in 1922, and the net for 1922, equivalent to but 4.14 per cent on the tentative valuation, should be regarded in the light of being even as large as it was only because the costs for the year did not include the entire cost of the strike, which was its outstanding feature.

Conclusion

Leaving the feature of surmise as embodied in the showing of $124,000,000 theoretically abnormal maintenance of equipment costs we revert again to actualities. The point in this discussion is that probably from October on, maintenance of equipment costs will be decreased from what they have been in the first nine months of 1923. The question remains as to whether they will be reduced sufficiently to restore them to the normal proportionate basis which existed prior to the war.

THE AKRON TRAFFIC ASSOCIATION, Akron, Ohio, at its annual meeting on December 11, chose as president for the ensuing year H. J. Zimmerman, traffic manager of the B. F. Goodrich Company; vice-president, C. J. Laney; treasurer, E. F. Malaney; secretary, H. L. Sovacool.

THE CITY OF CHICAGO is renewing its efforts to secure immediate action on the part of the roads entering that city in elevating their tracks. Presidents of the roads with terminals in Chicago have been invited by Commissioner of Public Works Sprague to state their positions on the matter in early conferences.

The Railways' Fundamental Need—Co-operation*

"Progress is the Growing Participation of More and More People in More and More of the Good Things of Life"

By Dr. Charles A. Eaton
Manager of Industrial Relations, General Electric Company

At different periods in the history of the world, civilization has chosen some one great instrument for its advancement. In the early ages that instrument was war. The Roman Empire was extended and consolidated and advanced very largely by that instrumentality. In the Middle Ages and for a thousand years, the chief organ of civilization was religion. Out of the religious impulse grew America, grew the great ideals of free self-government. In the nineteenth century, science was the chief organ of civilization, and with the application of science to the forces and resources of nature, the world made more progress in one generation than in all recorded time. Civilization has chosen a new instrument. Not religion—because that is the most fundamental element of human life and has ceased to be thought of as an instrument for the advancement of this, that or the other aspect of civilization. Not science—great and eternal and necessary as that is. The new organ of civilization is industry—the productive processes of men in the application of science to the resources of nature for the service of men.

The history of the world is a history of progress, and *by progress I mean the growing participation of more and more people in more and more of the good things of life.* Nothing else is progress.

We in the English-speaking world have steadily advanced, widening the franchise until all the people have a voice in the making or unmaking of their own government. That I call political progress, if the people have intelligence and character sufficient to support the institutions which they create. When you have a widening of opportunity for economic success, so that instead of having wealth in the hands of a few and the masses in dire poverty, you have, as you have in America, the widest distribution of wealth ever achieved in the history of the world and the highest level of comfort, then you have made economic progress.

Who Are the Capitalists?

Capitalism has its evils but the best cure for capitalism is more capitalists. We have approached that ideal in America far beyond any other race in all the history of the world. We have forty millions of our people in this country who own life insurance policies, with a face value of fifty billions of dollars. There are seventy-eight million policies—almost two apiece. Out of the moneys paid in by men like you and me, they have put together by co-operative effort a fund of nearly eight billions of dollars. Two billions of that money is in your railroads, so that these forty millions of people own two billions, or an eighth, of your railroads. We have seventeen billions of dollars in our savings banks, with twenty-six million depositors, and a very large slice of that great fund is invested in your railroads. Thus the savings bank depositors help to own the railroads. We have nearly twelve millions of people in this country who own homes. We have between thirteen and fifteen millions of people in this country who own some kind of an automobile—alleged or real.

A gentleman was elected to the Senate from the great state of Iowa and the first speech he made, they almost had to mop up the tears that he shed over the depressed and oppressed and downtrodden condition of the farmers in Iowa. They own one automobile for every five men, women and children represented in the state today, and the entire population of its state could get in their own automobiles and go for a joyride in their own cars and not leave anything behind them—not even the family cat.

I was in Cleveland not long ago and I heard a group of saviors who had arrived there to free the downtrodden and oppressed people of America. They issued a proclamation, the second paragraph of which read that at this moment the rich are getting richer and the poor are suffering in America. Where were those gentlemen when they issued that wail of anguish? They were in what we call the Engineers Building in Cleveland. Who owns that building? The Brotherhood of Locomotive Engineers! And right within gunshot of it is a magnificent bank that announces that it has twelve millions of dollars capital. Who owns that? The Brotherhood of Locomotive Engineers! And right down in New York they have another one—thank God! Whenever I hear of a new bank being erected by so-called working men, I unfurl the flag and thank God.

The Kingdom of God, as I see it, from the material point of view, will come whenever the man who will do a square day's work will have a surplus, and can pay his own bills and take care of his children and buy his own food and own his own home, and pay his own doctor and his own nurse, and be a man—all around four square, to every wind that blows!

Economic Progress

I want to see more homes. I want to see more houses that have homes in them, and fewer palaces that have fools in them. I am not anxious, any more, to see people getting very rich. A few people have been able to do that and endure it. Their children have been placed under a strain that is almost unendurable, and in almost every case their grandchildren have hardly stood the strain. What I want to see is all our people comfortable; not by legislation, not by some scheme invented in the brain of a Trotsky and brought over here by a mess of un-American parrots, but by the old-fashioned American way of sweat. By thrift, by integrity, by economy, by the use of brains and investments, by iron self-control and self-discipline, I want to see all our people well-to-do, and when they are, then you have reached what I call economic progress.

Now if *progress is the growing participation of more and more people in more and more of the good things of life,* just look down the centuries and see how the stream runs. Here is the individual, and if he is going to participate in more and more of the good things of life, he has to have a good body, he has to develop his mind, and out of that development is grown science and out of science life has been lifted to a continuously higher level. He has to cultivate his soul, so that while he lives in this world for a little while yet he knows that he is a child of the eternal world, and that while he is a brother of men he bases that brotherhood upon the fact that he is a son of God, who is the Father of

*Abstract of the opening or keynote address at the Sixteenth International Conference of the Transportation Department of the Young Men's Christian Association, held at St. Louis, Mo., November 15-18, 1923. Addresses by E. T. Whiter, vice-president, Pennsylvania Railroad, and Wm. H. Johnston, president, International Association of Machinists, were printed in the *Railway Age* of November 24, 1923.

all men. And so down the centuries progress consists of the development of the individual—mentally, morally and physically.

Transportation is Essence of Progress

Now the essence of the progress for the nation, the most progressive nation, is transportation. Down the centuries that is the organizing principle that makes possible real social progress. The greatest day in history was when they discovered a wheel. It may be that some cave man was dragging home an animal or a wife or something, and a round stick got underneath and relieved the friction. At any rate, they discovered that a round wheel would lighten the load. That was thousands of years ago. How long it took them, before they had an ox wagon, and then how much longer before they had an engine on wheels, and then how much longer again before they had the transcontinental express running from ocean to ocean! What an event it was when they discovered that a stick of wood floating on water would carry more than its weight. Out of that grew the canoe, and then the boat, and then the sailing boat, and finally out of that grew the gigantic liners plying between the continents and knitting them together. A long process!

After a while America was discovered, because they had a sailing vessel. And when they got here, they were fixed on the Atlantic seaboard, and shut up there by the Alleghanies and the Appalachians, until they could find some way of hauling themselves and their possessions over into these fat lands of the West. They tried mules and oxen and the covered wagon and walking—all very ancient methods of transportation, and useful. They tried canals, canoes and what not, all of which worked when there was any water. And then at last, in 1828, they turned the first sod for the first railroad. Everybody in America with any imagination or vision saw that the new day had dawned, and for a generation or two the railroad became on this continent the symbol of progress. The railroad preceded the settler, crossed the empty spaces, made it possible to deal with the hostile Indian, made it possible to create new states, build new cities, gave value to the land with no value. And so the railroad became not only the symbol of progress but it became the instrument for building up this great nation and the great nation of Canada.

Now this is my argument—*progress for all the world is the growing participation of more and more people in more and more of the good things of life.* The chief instrument of a material kind for all progress down the centuries has been the art and science of transportation, and at last, in this continent especially, that science has centered around railroading. I could give you figures, with which you are more familiar than I am probably, to show the gigantic magnitude of our railroad business.

We have now a very singular situation. Canada has too many railroads. This country has not enough. Canada's railroads are half loaded. This country's railroads are overloaded. But in this country we had a generation or two when the railroad manager was crowned with a rosy wreath as a rail benefactor and the railroad worker was looked upon as a highly respectable gentleman. Then human nature began to get in its deadly work, and railroads became too popular, which is a very dangerous thing. They became too profitable, which was still more dangerous. Then the great American people began to become suspicious. They began to become antagonistic and they had good reason to be. Then finally they set about, through the only agency we have, to make laws that would harden their arteries.

Hardened Arteries

It is just as sensible for a man who hardens his arteries to hit himself on the head with a club. But that is what we did, and for a generation in our legislatures or halls of Congress, if they had a spare hour off they used it in passing some unworkable anti-railroad law, until when the war came on we had a mass of contradictory and unworkable railroad legislation in this country that amounted to genius. The only way it ever could be understood would be to postpone the understanding of it to the Day of Judgment, so that omniscience would have a chance at it!

Then came the war, and as a war measure the government took the railroads—and operated on them for 26 months. The very first act of the federal government had to be to cancel all railroad legislation. They had to begin all over again. So we went through the war, and during the war we discovered something: That the railroads weren't something outside of our life, they weren't something that politicians could make a football of. They weren't something that the financiers could make a football of. They were the arterial system of the body politic and they affected intimately every day, every man, woman and child in the nation.

Since the war, we have begun to sober up, and we are beginning once more to think of the railroads in terms of the whole problem. The farmer is still grouching about it. The railroad employee is still obsessed with the notion that the railroad employee is quite a fellow. Well, he is. I am going to pay him a tribute pretty soon. The railroad manager who used to be quite an arrogant gentleman has become rather humble and it has improved him a lot. He is beginning to think of the railroads, not as his proposition, but as a service to all the people. The politician even (which is almost unbelievable!) is becoming better; he is coming under the leadership of a few real statesmen we have in this country, who see that the railroads are as vital to the well-being of the people as the arteries are to the health of the body.

I believe that the American people have come right now to the beginning of a new era, and I am willing to make the prophecy that we will pretty soon permit the railroads to earn enough on their investment to make their securities salable in the markets of the world, so that they can go on growing. They have not been able to do that for 10 or 15 years. The most important business we have, we have choked and strangled and scandalized and depressed, until we were in danger of stopping it. And now while we still are far from perfect, we have one board that runs the men, another board that runs the managers, and someone else who runs something else; and if the day ever comes when we will let the railroad men run the railroads, the trick will be turned. We will, too, just as soon as we think we can trust them.

R. R. Y. M. C. A. a Stabilizer

Now in this transportation system which is the arterial system of the body politic, you have the Y. M. C. A. What is it doing there? Why, it is the heartbeat of the whole thing. For at the bottom of every problem in economics and politics is a human being, and at the bottom of the human being the thing that makes him a problem is that there is war between his mind and his morals. The Y. M. C. A. in the transportation system of this country is a stabilizer, an inspirer, an insurer. If its great message can be saturated throughout the length and breadth of the transportation system of the continent, it will become probably the chief instrument in ushering in the new day.

For after all, gentlemen, the real source of life is in the soul. A man is his soul—nothing else is the man. A man is never mean unless he has a mean soul. A man is never weak unless he is weak in his soul. You don't surrender to temptation because of the strength of the temptation. You surrender because of the weakness of your resisting moral nature. The destiny of a man is in his soul. A nation is its soul. There is nothing wrong with Europe except that its soul has gone rotten. And it never can get well again until the fires of hate and suspicion and revenge and race and class consciousness are burned out, and a new birth in

the spirits of men, of friendship, and trust and brotherhood and love, takes place.

Your Y. M. C. A. in railroad work deals with the heart of the whole problem—the soul of the thing. And that is why I am in industry, because unless industry creates a soul, the world is lost.

Human Problem Cannot Be Ignored

No manufacturer can deal with his men any more except as human beings and he has to be human himself to do it. You can't handle the railroad problem as a political problem or even as an economic problem and ignore the human problem. That is where it will sink or swim, win or lose. And so the Y. M. C. A. in our railroad transportation system is close to the heart of the thing, and you men, some of you paid secretaries, many of you railroad men who are giving your lives to it (God bless you!), are giving the thing a soul.

I come now to the last point in my argument, which is this: That if *the progress of the world is the growing participation of more and more people in more and more of the good things of life,* and if in that process of progress transportation has played the leading role, or at least a leading part, and if in transportation the problem in the last analysis is human, and if in the handling of that human problem the great divine human Christ, as expressed in this religious body of the Y. M. C. A., is closer to it than anything else, then you gentlemen are here tonight with a wonderful, wonderful opportunity and a tremendous responsibility.

Therefore, I say that our first need is to take thought to ourselves. Your country, so far as you are concerned, can be no better than you are as a person. Your government will be no better than you are as a person. What will it matter if you gain the whole world and lose your own self? The issues of life and death, and time and eternity, are in the soul of a man, and while you are giving attention to others and to the great movement of the age and to the great purposes of God, don't forget that in this universe that you alone, because you are divine, would be worth the infinite resources of God, to create, recreate, redeem and take into an eternal life. That is my estimate of a human being's worth.

Now if that is true, you have two things to do for yourself. First, learn to think in terms of the whole problem. * * * * It is human nature to divide into groups and classes. * * * * You have a diversity of gifts and graces and powers in order to do the diversified work of the world. But don't take it too seriously, because it will never get into any other world but this. It will be left in the graveyard. So, gentlemen, pay attention to religion. * * * * We are fortunate in having come under the influence of the one person who was a complete revelation of God to men, and we have in our possession the most radical and marvelous message to the world that ever was conceived of, and that never could have been conceived of by human imagination * * * * .

Fundamental Need of Transportation

You have that, and I ask you to believe afresh in yourself. There is not a man in this room who has ever begun to be the man he can be. You are coughing along on one cylinder when you ought to be riding along on all six. You have powers in you that you never dreamed of. You have manhood, resources of character and courage and achievement, that you have never used and that you may go through the world without knowing you have, unless somebody can kindle your life and turn your eyes to these vast treasures of unused resources that every one of us has. And so our first attention must be to ourselves, gentlemen, to sink the roots of our life down beside the rivers of God. You can't have a big tree unless you have deep roots.

So I come to the answer of my question. I give it in all humility. The fundamental need of transportation is the fundamental need of all industry, all social relations and all individual life—it is the spirit of service expressed in wholesome, happy, brotherly, loving co-operation with the other fellow. That is our fundamental need.

You need money on the railroads. You have spent over a billion this year. The railroad men of this country stand out today as possibly more worthy of praise than any other industrial group we have, in the amazing ability that the managers have exhibited. I don't know where they have got their billion dollars, but they have it and spent it on betterments and maintenance.

I travel sometimes from three to four nights a week on the sleeper. I travel as high as ten thousand miles in a month, and away back in that Pullman I go to bed at night, feeling that up in the cab is a man whom I can trust with my life. You couldn't hire him, with any money, to do that. You couldn't put a boss over him that would make him do it. But in his soul is a sense of moral obligation to the job that he has. He is a king. The railroad workers of this nation and this continent, take them by and large, are probably the highest type of men who earn their living by toil, that we have in the country.

The managers have performed a miracle, and are coming back into the confidence and affection and friendship of our people, and better days are here. Let us hasten them, by the cultivation between management and men of the spirit of service. If you are simply running a train, that is drudgery. But if you are serving one hundred and ten millions of people in their most vital service, that is worship—that is religion, that is romance, that is everything. If you are just a track walker, driving in the spikes, that is drudgery. But if you have a train coming around the corner with one hundred people in it, men, women and children, and they must be saved as they pass by, you are their savior; you are not a mere driver of spikes. You are the savior of these lives—their guardian, the best friend they have.

Talk about dignity! There is nothing that could be more dignified than that, nothing could be more glorified, than the spirit of a loving service and co-operation.

I want to say here, too, that I hope the day will come when the railroad men will settle their own troubles, and they won't be chased around by politicians and boards and regulations and rules, until they don't know where they are. I have confidence enough in any group in America to believe that if they will get together and look each other in the eye, and be true to their own higher instincts of honor and manhood, they will settle themselves practically every question between them that ever comes up in dispute.

The spirit of service—I ask you to apply this to yourself personally. I summon you tonight to work not only for yourself, but begin and make your railroading and your Railroad Y. M. C. A. a service of your country.

Here is Canada and here is the United States, side by side, for 3,000 miles. There has not, in over a hundred years, been a day that we have not had questions in dispute between those two nations, that in Europe would have created war. That is a plain, sober statement of history. And why have we been at peace all these years? Why? Because, gentlemen, we have the same souls—that is why. Men are never in agreement until their spirits are in agreement. They may differ intellectually. They usually do, and will. They may differ on questions of policy and program, but if their hearts are one, what difference does it make? And here we stand, a monument to all the world. How do we do it? When we get into a fuss between Canada and the United States we appoint a board of something or other, between the two nations, and they decide. If the decision is against this country, we "holler" that we have been defrauded of our rights, and having done that we go about our business and accept the award. If it is against Canada, they say these mis-

erable Yankees have robbed them once more, and then they go about their business and forget it, because down in their hearts they know that the men on that board, or that committee, have had the same moral standard, the same soul, the same sense of justice. The people have confidence in them. Now let's have that in our business.

Lastly, in this spirit of service, expressed in co-operation, which is transportation's fundamental need, as I see it, let us go back to our task and make it a worship instead of a drudgery, working for the Kingdom of God.

I go out into the streets and see the newsboy, the policeman, and clanging cars and rushing automobiles, and it all looks like confusion; and then I know, when I think that I am with God, that this is His world; He loves the men of the world. Just now we are far in advance of any other people, but we have got to wait and help them catch up, because He doesn't love the American or the Canadian a bit better than the European. We are all in His image, and some day when we find that we are working for His Kingdom, which is justice and righteousness and peace in the Holy Spirit, then the common task of our railroading and the hard drudgery of our Y. M. C. A. work will become glorious and beautiful and vibrant and incandescent with that wonderful love. Men can never unite when hate is in their hearts. They can always unite when love is there.

So I summon you tonight to this glorious task, and when this conference is over, and you go back to your work (you Y. M. C. A. men bearing great burdens, often discouraged; I know how hard it is for you) I pray and hope that you will go back girded with an inner vision, a vision of the process you are associated with, and if you railroad men help us in America by setting us the example of co-operation between yourselves and service to the world and the public at large, and if thus we catch the spirit—a spirit of service expressed in co-operation—we will advance the progress of civilization, advance the Kingdom of God, and ourselves earn the right to be described as men.

How Mechanical Officers Can Help Improve Public Relations*

By J. E. Bjorkholm

Asst. Supt. of Motive Power, Chicago, Milwaukee & St. Paul, Milwaukee, Wis.

THE RELATIONSHIP between the railroads and the public is strained, at least in certain quarters, and some politicians and would-be politicians are working feverishly to bring these relations to a breaking point, hoping thereby to cause chaos in the nation's transportation system with a resultant public demand for national ownership or operation. This at least appears to be the object of our newest brand of statesmen, many of whom have apparently graduated over night from Main Street obscurity to the position of transportation experts.

The foremost link between the railroads and the public is service and the brand of service rendered is therefore of vital importance in shaping the relations between the roads and the public. Poor service naturally tends to aggravate an already acute condition, while good, first-class service, on the contrary, acts like cooling compound on a hot bearing. It is an antidote against the untruthful, anti-railroad propaganda now being circulated. Motive power officers can best assist in improving public relations by endeavoring in every way possible to maintain, dispatch and operate the motive power under their immediate care in such a manner that, barring unforeseen accidents, it will handle trains promptly, safely and on time.

Next to service comes economical operation. Motive power officers have the expending of many million dollars annually and the manner in which this money is spent reflects largely on the ability of the officers themselves. The expenditure of money in a manner that cannot be defended from a business standpoint goes far toward making the railroads unpopular, as this wastefulness is usually brought to the attention of those whose prime object it is to discredit the roads. Do we fully realize that each time we furnish examples of this kind to those waiting an opportunity to discredit the railroads we ourselves assist in magnifying a case that sooner or later will have to meet its supreme trial?

Roads Must Enter Politics

After providing service and sound, economical business operation our task is to bring before the public the true accomplishments as well as handicaps of American railroads. I believe it is better appreciated every day that the time has come when the railroads must enter politics in order to safeguard their interests—not the politics of old, but through educational campaigns impressing upon those, who have the interest of the railroads at heart, the necessity of exercising their franchise on election day. We have many opportunities in our own daily association with employees, as well as the public, in clarifying issues bemuddled by the press and other antagonistic agencies. We must fit ourselves to contradict successfully unfounded statements whenever the opportunity presents itself and we must do this in a pleasant and straightforward manner, not inviting offense.

In order to reach the public our employees must largely act as the intermediary and our success in convincing the public depends largely on our success in convincing the employees. This is no small job but there are ways in which it can be accomplished by suiting the argument to the occasion. We should be particularly careful, however, to stick to the truth and not make statements which cannot be amply supported by facts.

(Mr. Bjorkholm here mentions many of the misstatements and accusations commonly made against the railroads and presents evidence to show how unfounded they are. Most of them have already appeared in the columns of the *Railway Age* and are more or less common knowledge so they will not be reprinted.—Editor.)

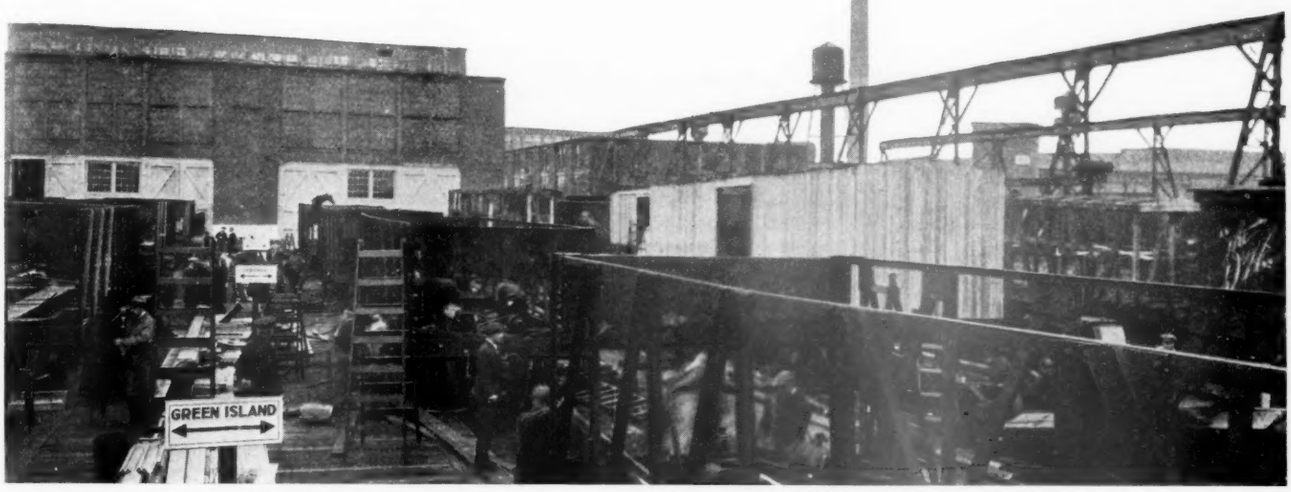
The great majority of the public I feel is willing to be convinced but we cannot rely on anyone but ourselves to carry the railroad message to them regardless of which department we represent. As our employees are such a large factor in shaping the road's relations to the public, we must engage their service and willingness in bringing about that better relationship. Particularly in small communities which are largely supported by railroad interest, the railroad employee takes a dominant part in shaping public opinion and it follows that the relationship between the public and the railroad is the same as the relation between the railroad officers and the employees. Fair and honorable treatment in all our dealings with both the employees and the public is the prime factor in bringing about that better relationship. There are many thousand employees in the mechanical department and most of whom are bright, intelligent citizens, occupying a respected place in society. It follows that the mechanical department officers and employees, if properly co-operating, have an excellent opportunity to bring about a better relationship with the public to the mutual benefit of all.

I am not so vain as to believe that we can persuade all employees to share our views, but I do believe that many adverse critics can be converted to boosters if the true facts are brought before them in a convincing manner.

*Abstract of a paper presented at the 1923 master mechanics staff meeting of the Chicago, Milwaukee & St. Paul.

D. & H. Conducts Unique Car Repair Contest

Five Teams Compete for $120 Prize Offered for the Best Performance in Rebuilding a Hopper Car



The Carbondale Team Finished Dismantling in 1 Hour and 37 Minutes

A UNIQUE EXHIBITION of car repairing was given in a contest held by employees of the Car Department of the Delaware & Hudson Company at its Colonie shops on October 31, 1923. The entire woodwork of five D. & H. composite twin hopper cars of 85,000 pounds capacity was removed and rebuilt in record time. These cars are equipped with steel underframes, metal posts and braces; the superstructures are of composite construction—wood and metal—wood predominating. The inner dimensions are: length 32 ft., width 8 ft. 11 in. In a single car there are 1,947 board feet of lumber.

Five teams of six car repairers each participated in the contest, one team from Carbondale, Pa., representing the Pennsylvania division, one from Oneonta, N. Y., representing the Susquehanna division, and three from Green Island, representing the Saratoga division. At each of these points work of this character is an everyday performance.

The response which greeted the announcement of the contest assured its successful results. However, stimulus, if any were needed, was provided by a prize of $120 in gold, offered by the management to the team proclaimed the winner upon the basis of workmanship and time. Interest ran high, the foremen were in frequent consultation discussing the probable candidates, and a friendly but spirited rivalry among the men ensued, each division endeavoring to select its best as a representative team.

This project was promoted to exemplify the merits of system and co-operation and the benefits accruing to the workmen under the piece-work plan of compensation. The performance indicates that it achieved its purpose.

The Winning Team—Left to Right: James Snee, Fred Ross, Larry Zappa, Tony Yaggort (Material Man), John Volano, Louis Moldinaro, C. W. Norris (Divisional Car Foreman), Leo Baker and Raymond Schuster (Foreman)

The plans formulated for the occasion provided for the use of two sets of cars of identical type, the work to be strictly in accordance with standard shop practices. That none of the contestants should be afforded any advantage by reason of home shop conditions prevailing, Colonie, where heavy freight car repairs are made chiefly to box cars, was selected for the demonstration.

Operations started promptly at 8:00 a. m., proceeding uninterrupted until completion, the men having voted to remain at work throughout the usual lunch period. Coffee and sandwiches were passed around and while this occasioned little delay, no allowance of time was made therefor in the record established.

THE STANDING OF THE FIVE TEAMS

Carbondale Team

	Time	Applied Man. Hr.
Dismantling	8.00 a. m. to 9.37 a. m.	9 hr. 42 min.
Construction	9.37 a. m. to 3.49 p. m.	37 hr. 12 min.
Complete	8.00 a. m. to 3.49 p. m.	46 hr. 54 min.

Total time, 7 hr. 49 min.

Green Island Team No. 1

	Time	Applied Man. Hr.
Dismantling	8.00 a. m. to 9.40 a. m.	10 hr. 0 min.
Construction	9.40 a. m. to 4.05 p. m.	38 hr. 30 min.
Complete	8.00 a. m. to 4.05 p. m.	48 hr. 30 min.

Total time, 8 hr. 5 min.

Oneonta Team

	Time	Applied Man. Hr.
Dismantling	8.00 a. m. to 9.43 a. m.	10 hr. 18 min.
Construction	9.43 a. m. to 4.26 p. m.	40 hr. 18 min.
Complete	8.00 a. m. to 4.26 p. m.	50 hr. 36 min.

Total time, 8 hr. 26 min.

Green Island Team No. 2

	Time	Applied Man. Hr.
Dismantling	8.00 a. m. to 9.50 a. m.	11 hr. 0 min.
Construction	9.50 a. m. to 5.05 p. m.	43 hr. 30 min.
Complete	8.00 a. m. to 5.05 p. m.	54 hr. 30 min.

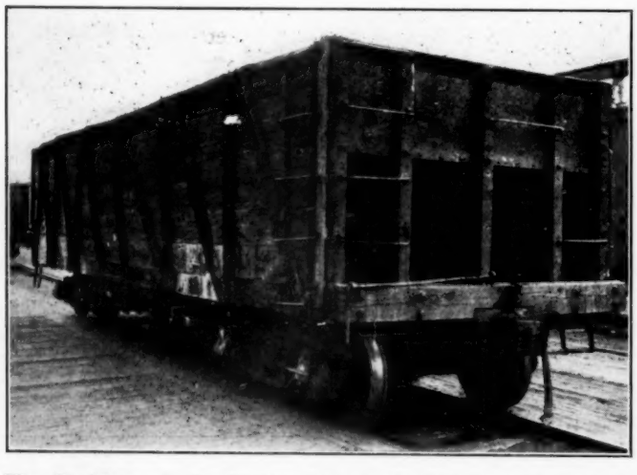
Total time, 9 hr. 5 min.

Green Island Team No. 3

	Time	Applied Man. Hr.
Dismantling	8.00 a. m. to 9.57 a. m.	11 hr. 42 min.
Construction	9.57 a. m. to 5.36 p. m.	45 hr. 54 min.
Complete	8.00 a. m. to 5.36 p. m.	57 hr. 36 min.

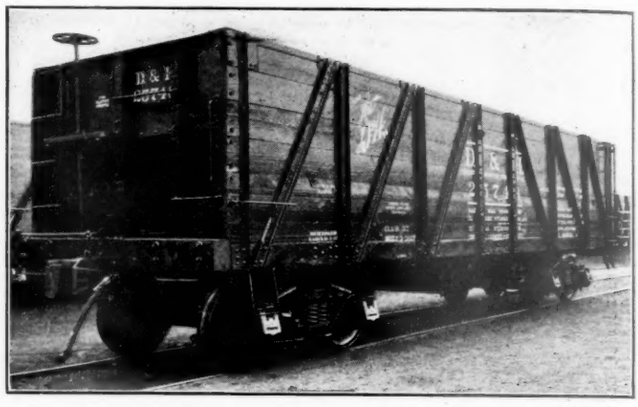
Total time, 9 hr. 36 min.

Five cars in bad order were placed on one track for stripping, proper working space being provided. Likewise arranged on a parallel track were five other cars with the metal work already treated, preparatory to rebuilding, thus avoiding delay. First the tear-down work was undertaken and was completed in remarkably short time, notwithstanding the requirement that each piece of lumber removed should be freed of bolts, nuts and all other metal parts. The Carbondale crew completed the task first, doing so in 1 hour and 37 minutes, and within a very short time thereafter all teams had reported the work of dismantling ended. The maximum time was 1 hour and 57 minutes.



The Problem of the Contest—D. & H. Twin Hopper, Composite Car of 85,000 lb. Capacity

Promptly upon completion of the stripping the men proceeded to the opposite track where the work of construction was begun. Here it was found that all the material required had been systematically arranged, the lumber having been milled out to size and piled in the order of use at each car. Likewise, the necessary forgings and castings had been provided, together with the proper number of bolts. The material layout was one of the outstanding features, indicating, as it did, efficient and economical shop operation, and affording an ideal opportunity to study that phase of car repairing. The importance of the material feature cannot be overestimated. Its ready accessibility stimulates production and the resultant increased output is reflected in the earnings of the piece-worker.



The D. & H. Hopper Car Completed, Ready for Service

Steel Work Ready for the Application of the Wood, Which Is Systematically Laid Out for the Teams

The repairs made are scheduled as Class 4 with the exception of steel work. In so far as the woodwork is concerned, it constituted a rebuilt superstructure. In each car

782 holes were bored with aid of air motors and in the fitting of wood parts 233 gains were made.

The judges were A. A. Burkhard, general car foreman, New York Central Lines, D. H. Pyne, divisional car foreman, Boston & Maine and G. W. Ditmore, master car builder, Delaware & Hudson. Following a careful inspection, this committee reported that in its opinion the work of each team was of equally high standard so that the status of each was fixed by the order of completion, and Carbondale was declared the winner. In awarding the prize, Colonel J. T. Loree, vice-president and general manager of the Delaware & Hudson, an interested spectator throughout the performance, complimented the winners and expressed appreciation of the co-operation evidenced by the results. Thereupon, in behalf of the management, he made a further award of $50 to Green Island Team No. 1, which finished a close second.

As the records indicate, all the contestants made an excellent showing, reflecting credit on the system of training in vogue in the car department. The employees represent practically a new working organization, built up since July, 1922.

Warfield Plan Analyzed

WASHINGTON, D. C.

CLAIMS as to the large economies that would be derived from the operations of the Warfield "central agency" and car pooling plan, made by N. D. Ballentine of the National Association of Owners of Railroad Securities in an address before the Traffic Club of New York on September 25 have been analyzed in a pamphlet published by the Car Service Division of the American Railway Association, which finds that "the savings claimed are based on wholly imaginative and theoretical arbitraries which are not only thoroughly unsound but are actually non-existent."

Referring to the published pamphlet of the address, the Car Service Division says: "We see in this pamphlet the carefully prepared statistics of the railroads garbled and distorted into a massed statement which is illogical, meaningless and leads nowhere. Not only are these statistics misinterpreted, misused, and misapplied, but they are perverted either through ignorance or with a deliberate intent to mislead in a way to distort facts."

After taking up in detail the various claims made by Mr. Ballentine the analysis concludes with the following summary:

"The conclusion is inevitable that Mr. Ballentine is unable to present any substantial and convincing arguments in favor of the so-called plan of the National Association of Owners of Railroad Securities; otherwise he certainly would not attempt either through ignorance or with a deliberate intent to beguile and mislead the public with statements and conclusions which have no basis in fact. The really adequate and satisfactory answer to the whole proposition is the performance of the railroads during the current year and the promise that this performance holds for the future. In brief this is the record:

1. The greatest freight traffic ever handled.
2. The largest number of new cars and new locomotives installed in a similar period for ten years.
3. Capital expenditures in 1923 for equipment and other transportation facilities in excess of any previous similar period.
4. Reduction of locomotives requiring heavy repairs from 25.3 per cent to 13.7 per cent in a year.
5. Reduction of freight cars requiring heavy repairs from 12.8 per cent to 5.1 per cent in a year.
6. Greater coal movement to the lakes and larger volume of railroad fuel coal in storage than ever before.
7. Substantial improvement during the year in the average miles per car per day and in the average tons per loaded car.
8. Most equitable distribution of cars between different sections of the country.
9. A decrease in freight accumulations and of car shortage, both to negligible figures, and an increase in car surplus; all in the face of car demands that reached unprecedented figures.
10. Uniform satisfaction of shipping public with transportation service, conspicuously expressed in all parts of the country by all interests—agricultural, industrial, mineral.

"Under such conditions and having primarily in mind the standpoint of service rendered to the public and the economical and efficient operation of the railroads, which after all is in the interest of the public, it is difficult to understand the continued agitation for an untried, theoretical and highly speculative plan of car handling on the part of a special interest, which would have no obligation of responsibility either to the shippers, the public or the railroads, is not necessary to give the shipper adequate service, is not desired by the railroads and is not justifiable on the basis of any proven or reasonably probable economies.

"The address carries the impression of an attempt to discredit the program adopted by the railroads at a meeting in New York on April 5, 1923, to provide adequate transportation service in 1923, by indicating that there were fewer cars in service at the time the address was made than prior thereto, and that the repair program did not mean what it said. Mr. Ballantine might have, if he desired to fairly portray the real situation, shown that regardless of the retirements of old cars the transportation demands of the country were fully met. He could have also stated that as a general proposition every new car added meant another car available for transportation service, as the cars retired were practically obsolete and therefore had not been serviceable units before their retirement; that he did not so state must have been either through his ignorance of the situation or a deliberate intent to mislead.

"The greatest misleading impression on the part of the representative of the Security Owners' Association in his address was the attempt to enlist sentiment for the plan, if such it can be called, by holding out the prospects for reduced freight rates (that is, reduction of the gross revenues of the railways) if it was adopted—this on the basis of totally unsupported or unsupportable and purely imaginary claims for savings that could be effected by the adoption of the so-called plan."

Ballast Car Embodies New Dumping Featues

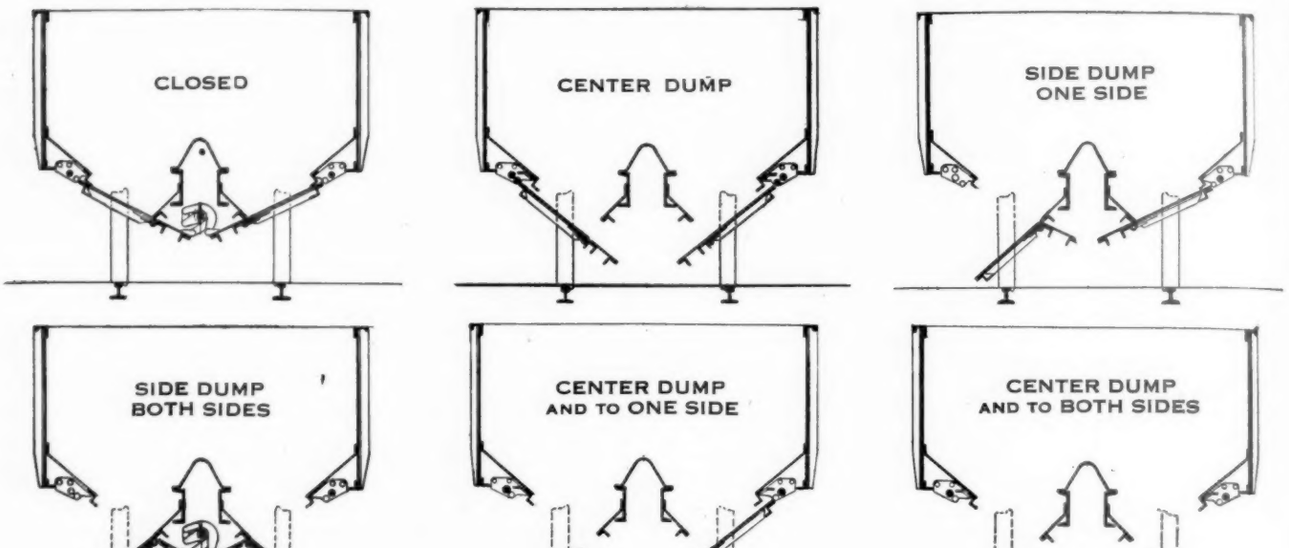
THE RODGER BALLAST CAR COMPANY, Chicago, is now introducing a new car known as the Hart selective type which is intended primarily for ballast service but which can be used with equal facility in hauling coal. No changes in the floor or dumping features are required when transferring the car from one service to the other. It is distinguished from the Hart convertible car in that it has no convertible parts, the term selective having been adopted to characterize the facility with which the contents of the car may be dumped at will between the rails, outside the rails, on one or both sides or at the three points simultaneously in whatever quantity is required for the work to be done on the track.

The selective cars are of steel or composite construction and are built in two distinctive types, a high side hopper car and a gondola car. The dumping arrangement for bal-

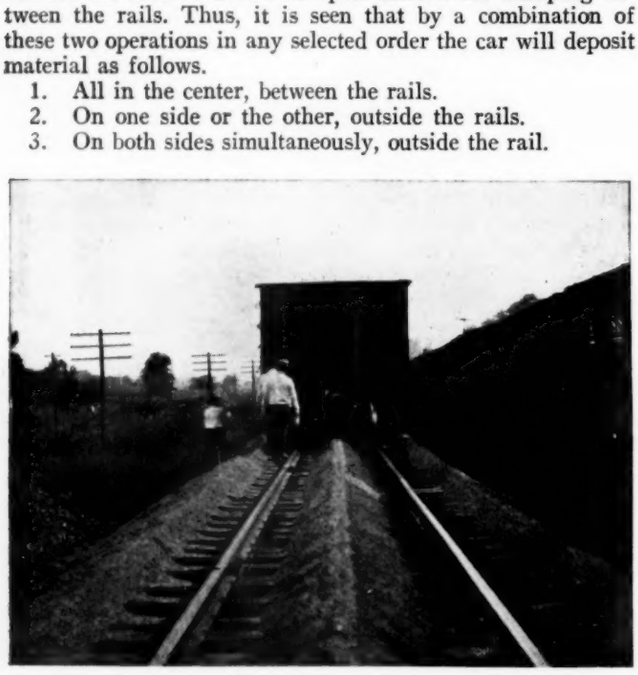
last occupies the space between the trucks, while for coal service the car dumps outside the rails for the full length of the car.

As seen in the cross-sections of the car, the bottom throughout the length of the ballast dumping portion is arranged in the form of twin longitudinal hoppers on either side of the center sill, which are designed to open outward for dumping outside the rails and also to open inward for dumping between the rails. Thus, it is seen that by a combination of these two operations in any selected order the car will deposit material as follows.

1. All in the center, between the rails.
2. On one side or the other, outside the rails.
3. On both sides simultaneously, outside the rail.



Six Arrangements of the Dumping Equipment

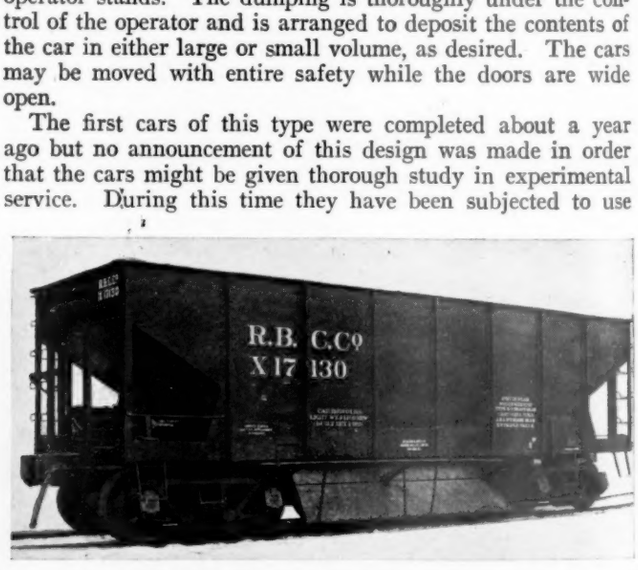


The Material Is Dumped Uniformly

4. In the center between the rails and on one side or the other outside the rail at the same time.
5. In the center between the rails and on both sides outside the rails at the same time.

The inside and outside dumping operations are controlled independently. The inside dumping is effected by means of a shaft extending crosswise of the car with a lever on each end, each of which is normally secured to the side of the car in an inoperative position, but either one of which may be used for operating the center dump. This promotes safety of operation and saves time as it is unnecessary for the operator to cross over the train. A separate lever is provided on each side for manipulating the side dump on the side on which the operator stands. The dumping is thoroughly under the control of the operator and is arranged to deposit the contents of the car in either large or small volume, as desired. The cars may be moved with entire safety while the doors are wide open.

The first cars of this type were completed about a year ago but no announcement of this design was made in order that the cars might be given thorough study in experimental service. During this time they have been subjected to use under a wide variety of conditions and with many kinds of ballast material on a number of different railroads in the United States, with uniformly satisfactory results.



The Hart Selective Type Ballast Car

DIRECTORS of the Western Petroleum Refiners' Association at a meeting on December 5 at St. Louis, Mo., decided that the association should refrain from participating in hearings pertaining to freight rates.

Study of Transverse Fissures Broadened

Bureau of Standards and Interstate Commerce Commission Join Roads and Mills in Investigation

A CONCERTED EFFORT to ascertain the true cause of transverse fissures in rails is now being inaugurated through the organization of a conference for the study of this subject in which the government as well as the interests directly concerned have representation. This conference, which was called at the instance of the United States Bureau of Standards, had its first meeting at Washington, D. C., on September 28 and was attended by representatives of the Engineering division of the American Railway Association, the steel manufacturers, the Bureau of Safety of the Interstate Commerce Commission, the Joint Committee on Stresses in Track and the Bureau of Standards. Other meetings will follow in order that all facts relating to the formation of transverse fissures may be considered exhaustively.

The problem of the transverse fissure has been the subject of an extended investigation by the Rail committee of the American Railway Engineering Association which has for many years employed the services of a technical staff that has been engaged in a study of data on rail failures gathered from the railroads. The committee has also maintained a close contact with the manufacturers and has held frequent meetings with representatives of the mills. The recent conference at Washington has the effect of carrying this work one step further in that it brings to bear the disinterested influence and services of the Bureau of Standards and the Bureau of Safety.

The most important action taken at the meeting on September 28 was the selection of a fact-finding committee of five, comprising one representative each from the five participating organizations. This committee has assumed responsibility for the compiling of information to serve as the basis for an exhaustive study of the transverse fissure from all angles.

As a means to achieve this end the Engineering division recently sent a circular to the railways, requesting them to furnish tabulations of detailed data with respect to all rails which have failed in track from transverse fissures. Specimen tables are included in the circular, indicating the character of information which it is desired to obtain, including not only the nature of the service to which the rails have been subjected in track, but also detailed facts concerning the manufacturing records of the heats from which the failed rails were obtained.

Considerable interest is attached to this movement because of its relation to the work of the Bureau of Safety of the Interstate Commerce Commission which recently presented a detailed report on the subject of transverse fissures, prepared by J. E. Howard, engineer physicist of the bureau, an abstract of which was presented in the *Railway Age* of August 4, page 210. The conclusions drawn by Mr. Howard in this report are largely in the nature of a reiteration of his previous findings, namely, that internal fissures in rails are the result of the cold rolling effect of traffic combined with excessive stress of the material in the rail set up by the heavy wheel loads of modern railway equipment. That this view is opposed by the Engineering division of the American Railway Association is indicated by a statement made in the circular recently issued. "Preliminary conclusions drawn from incomplete data strongly indicate a defective manufacturing condition in the rail head as responsible for transverse fissure failures and do not bear out the assertions of the Bureau of Safety of the Interstate Commerce Commission which has repeatedly insisted that excessive actual loads are the sole cause of transverse fissure development."

Studies of transverse fissure failures which have been made by the Rail committee of the American Railway Engineering Association disclose a marked lack of uniformity with reference to their allocation to certain mills or to certain heats. In other words, there has been a much larger number of failures in the rails obtained from certain mills and from specific heats of each mill. On the other hand, comparisons on the basis of use have failed to evidence any relationship upon which to found conclusions except as it has been noted that more failures probably occur in rails of greater hardness and those subjected to the largest volume of traffic. For example, the Rail committee has found no evidence that failures occur more often on curved track than on tangent, in light rails than in heavy sections or in track poorly maintained than in track well maintained.

Evidence that the quality of metal is at fault is offered in the wide difference in the number of failures of rails from different mills. Tabulations of the number of fissures reported per 10,000 tons of rails rolled by nine mills over a period of 12 years show an average of 16.6 failures per 10,000 tons whereas the average for one mill for the 12 years is as low as 1.8 failures while the averages for two of them reach 40 failures. For individual years, the averages of one mill range from 3.4 failures to 146.9, while those for another range from 0.4 to 5.6 failures. Another fact pointing to a relation between the prevalence of failures and the quality of the steel is found in a study of the ingot location of 6,000 rails in which fissures have occurred. This disclosed an almost uniform decrease in the number of failures from the "A" rails to the "G" rails with the average number occurring in the rails from the bottom of the ingot amounting to only 10 per cent of the average number found in rails from the top of the ingot.

That the appearance of a transverse fissure in a rail of a given heat is the precursor of further trouble of the same kind in the same heat is a phenomenon generally noted by railway officers. It is also the prevailing opinion that if as many as three fissures are found in a particular heat, this is an indication of possible defects in other rails of the heat with the result that current practice calls for the removal of all of the rails of the heat from main track. Thus on the Delaware, Lackawanna & Western, the location by milepost of the transverse fissures coincided with the location of specific groups of heats from specific mills. A case is also cited of a single heat delivered to one railroad which was inadvertently scattered over a wide mileage and which developed 27 transverse fissures in widely separated locations before the rails were removed from the track.

As affording further material for a tentative conclusion that the material in the rail is responsible for the transverse fissure, attention is called by the Rail committee to the discovery by Warring & Hofanmann of minute cracks occurring in the nucleus zone of transverse fissures and which may be identified in practically all rails which failed from simple transverse fissures. A thorough study of these phenomena has led to the conclusion that these shattered portions of the rail head probably form the nucleus from which the rolling loads developed the detailed fracture to ultimate failure and that the solution of the transverse fissure problem is to be found in the discovery of conditions favorable to the formation of this shattered structure in the process of manufacture.

Senate Still Deadlocked on Committee Chairmanship

WASHINGTON, D. C.

THE LITTLE GROUP of radicals in the Senate who are trying to block the election of Senator Cummins as chairman of the committee on interstate commerce, which deals with railroad legislation, had kept the Senate from completing its organization up to Wednesday afternoon, when the contest was postponed until the Senate meets after the holiday recess on January 3. Twenty-five ballots have been taken in all, 16 this week, and on the last 11 Senator E. D. Smith of South Carolina, who was chairman of the committee during the latter part of the Wilson administration, led, but without a majority of the votes cast. While to some this seemed to point to the ultimate election of a democrat, it was also thought that many of the democrats do not really desire the responsibility of the chairmanship of a committee which is split three ways, with rather a preponderance of radicalism, and which they could not hope to control, and that finally enough of them might absent themselves long enough to give Cummins a majority. The democrats appear to be enjoying hugely the failure of the republicans to keep their house in order, and there was some debate on Wednesday in which several of them taunted the majority party.

After having failed in their efforts to elect Senator La Follette, who commanded only 7 votes, the radicals first attempted to bring about the election of a democrat, and would have succeeded if they had all followed the plan, but two of them, Senators Norris and Howell, continued to vote for La Follette and one democrat, Senator Bruce of Maryland, switched to Cummins. An effort was then made to compromise first on Senator Howell of Montana and then on Senator Couzens of Michigan, who had been voting as a regular republican for Cummins, but who is considered somewhat radical in railroad matters. However, while a few regular republican votes were thus attracted, the maximum for Couzens was only 14, and on the later votes this was reduced to 11, 12 or 13.

Five additional ballots were taken on Monday, December 17, nine more on December 18 and two more on December 19 without result. On the first on Monday Cummins received 43 votes, Smith 39, Howell 6 and Couzens 1. Senator Jones of Washington then switched to Couzens, announcing that in his opinion it was clear that Cummins could not be elected and Couzens received 9 votes, including 6 of the radicals, to 41 for Cummins and 39 for Smith. Senator Norris continued to vote for Howell. Cummins himself voted for Couzens. On the next two ballots Senators Borah and Norris voted for Couzens, making his total 11, and on the fifth Senator Norbeck made the total 12 for Couzens, while Cummins and Smith each had 38. On Tuesday the first, second and third ballots showed 37 for Cummins, 39 for Smith and 14 for Couzens, Senators Capper and Gooding having deserted Cummins. On the fourth ballot Senator Borah voted for Senator Fess of Ohio. On the fifth, Senator Willis, who had been voting for Cummins, also voted for Fess and Senator Edge voted for Senator McLean. On the sixth, Senator Edge returned to the Cummins standard, while Senator Cummins voted for McLean. On the seventh there were 35 for Cummins, 39 for Smith and 11 for Couzens, while Borah and Willis continued to vote for Fess and Cummins did not vote, but on the eighth, when Johnson of Minnesota voted for Smith, Cummins and Borah voted for Couzens, and Smith had 42 votes to 36 for Cummins. The ninth ballot stood 37 for Cummins, 42 for Smith and 11 for Couzens. Forty-six votes were necessary for a choice. On Wednesday Cummins received 32 votes on one ballot and 34 on the next, while Smith received 36 and Couzens 13.

On December 12 Smith would have been elected had not Senator Bruce of Maryland, democrat, voted for Cummins. Even then Smith might have been elected if all seven of the La Follette supporters had voted for him. Senator Bruce, who voted for Cummins on all three ballots on December 12, explained his action later by saying he had learned of the plans of the "La Follette-Magnus Johnson-Brookhart radical element" to shift to Smith under circumstances that it seemed to him would make the election not a democratic triumph but rather a significant one for La Follette and his following, and that he had decided that the "inevitable split between the conservative and radical members of the Senate had come." "As far as I am concerned," he added, "it might as well be understood now as later that no boat has room enough to hold Senator La Follette and his adherents and me."

The radicals then proposed a compromise on Senator Couzens. The proposition was not accepted but the balloting was resumed on December 17, when the La Follette group voted solidly for Couzens after trying one vote for Howell.

Organization of the House committee on interstate and foreign commerce has been completed. The two new republicans elected to fill vacancies are A. M. Wyant of Pennsylvania, and O. B. Burtness of North Dakota and the four new democrats are A. C. Shallenberger of Nebraska, Robert Crosser of Ohio, Parker Corning of New York, and T. B. Parks of Arkansas. The re-elected republicans are: Samuel E. Winslow of Massachusetts, chairman; James S. Parker, New York; John G. Cooper, Ohio; E. E. Denison, Illinois; Everett Sanders, Indiana; Schuyler Merritt, Connecticut; Carl E. Mapes, Michigan; William J. Graham, Illinois; W. H. Newton, Minnesota; and Homer Hoch, Kansas. The re-elected democrats are: A. W. Barkley, Kentucky; Sam Rayburn, Texas; George Huddleston, Ala.; C. F. Lea, California, and H. B. Hawes, Missouri.

A resolution which its author said was intended to meet President Coolidge's recommendation that Congress order a reorganization of the freight rate structure was introduced in the House on December 17 by Representative Hoch of Kansas, as House Joint Resolution 94, directing the Interstate Commerce Commission to take action relative to adjustments in the railroad freight rate structure and the fixing of rates and charges.

Additional bills to prohibit the collection of surcharges have been introduced by Senator Walsh and Representatives Barkley and Doyle.

Senator Johnson of California has also reintroduced as S. 1238 his bill of last year to amend section 439 of the transportation act by prohibiting the payment of dividends by railroads unable to furnish an adequate car supply. Senator Harris of Georgia has introduced two bills S. 1499 and 1450 to require railroads to use steel passenger cars and prohibit the use of wooden cars under certain circumstances. Senator Gooding of Idaho introduced a bill, S. 1227, to repeal section 15-a.

THE OHIO STATE Industrial Traffic League at a meeting on December 5, voted to demand that rates from Ohio shall also be lowered if transcontinental freight rates from the middle west to the Pacific coast are reduced by the Interstate Commerce Commission as a result of a hearing which will open in Chicago on January 2.

THE CANADIAN PACIFIC has loaded 1,386 cars of grain per day from September 1 to November 30 compared with 1,265 cars for the corresponding period of the previous season and 1,115 cars in 1915. The total for 1923 has broken all previous records for grain transportation, having totalled approximately 37,000,000 bushels of grain on the western lines and 103,891,000 bushels on the system, from September 1 to November 29.

Possibilities and Limitations of Fusion Welding*

The Welders' Opinion of How Electric Arc, Gas, Thermit and Resistance Welding Should Be Used

PART I

THERE WAS A TIME when the wearing of a fraction of a cubic inch of metal from one of the wearing surfaces of a piece made it necessary to scrap the part with a consequent loss of material and labor investment. It was only after the introduction of the fusion welding processes that it became possible to stop this economic waste. By spending a few dollars for welding it is sometimes possible to save parts involving many hundreds of dollars, not only by reclaiming the worn parts, but in savings due to the much less

Solenoid Brake Wheel Manufactured from Stock Steel Parts Joined Together by Automatic Arc Welding Process

time required for welding than for replacing them by new ones.

The repair of broken members of machines has been another important engineering achievement made possible by the electric, gas and thermit processes. Here, again, there are instances every day where the returns on the money spent in welding are as high as 1,000 per cent as compared with replacing these broken parts by new ones.

Of recent years there has been a strong tendency towards substituting castings made of steel for those made of cast iron. The reasons for this are that the steel castings for the same strength are lighter and less brittle and consequently less likely to break under shock. But, steel castings are more liable to defects such as blowholes than are cast iron ones, and as their cost is higher any process that can reclaim steel castings is of great benefit to the manufacturer. Welding processes are used very largely for this purpose, and have resulted in material saving and doubtless in the extension of the use of steel castings in place of cast iron because of the reduction in cost effected by welding processes.

*Abstract of paper prepared by the Meetings and Papers Committee of the American Welding Society for the fall meeting of the society, held at Pittsburgh, October 24-26, 1923.

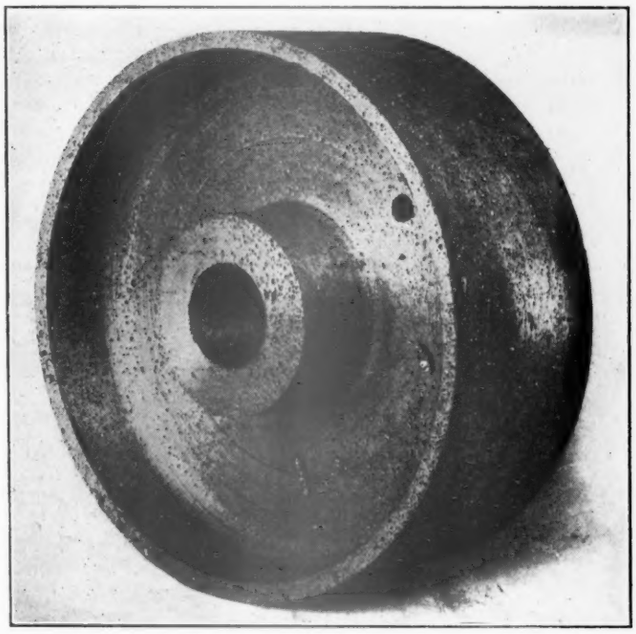
Very often mistakes are made in machining, and were it not for welding these valuable castings would be rendered useless. As it is, the only loss is the time and money necessary to deposit new metal by one of the welding processes. Here, again, the returns on the welding investment may be as high as several thousand per cent.

Possibilities of Welding as a Fabricating Process

The manufacturing process of building a large structure by riveting consists of the following:

1. Design
2. Making drawings.
3. Making templets.
4. Marking steel.
5. Punching or drilling holes.
6. Assembly.
7. Riveting.
8. Painting in shop.
9. Erection.
10. Painting in the field.

At the present time there would be very little saving in the time taken to design a welded structure as compared with a riveted one. This is due largely to the fact that in most



Solenoid Brake Wheel Manufactured from Cast Steel, Showing Flow Holes in Casting After Being Turned Down, Resulting in the Manufacture of This Wheel by the Automatic Arc Welding Process

cases both would involve the same kind of stress determinations. However, a shop drawing of a riveted structure requires a great deal of time and entails a large expense for practically every dimension is indicated on the drawing, every rivet is carefully located and the size, width and length of every structural shape is given. The amount of work involved is readily estimated when one considers that in a very simple small plate girder railroad bridge there are about 6,000 rivets. A very small fraction of this time would be

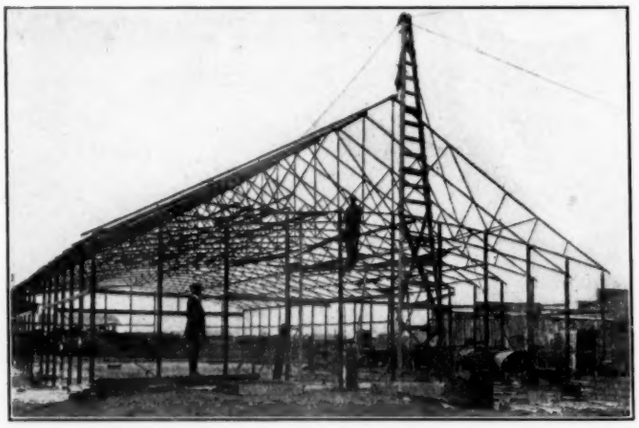
needed in preparing working drawings for a welded structure.

After the drawings are finished for riveted work, they are sent to the templet shop where full size templets made of wood or heavy leather board are prepared for each and every piece in such a way that all holes to be finally placed in the steel are indicated in position and size on the templets. These templets are then sent into a shop where they are clamped to the steel, and each steel piece is marked to conform to its duplicate both as to size, shape and location of all holes. These pieces of marked steel are then passed through shearing machines, shearing them to shape and through punches to punch holes. The numerous pieces which make up the girder or other members and which have been cut to shape and punched are now assembled and temporarily bolted together with a few bolts—all the parts and pieces of steel which are in contact having been given a coat of paint.

In contrast to the work involved in riveted structures outlined in the above paragraph, all of it is omitted in the welded structure.

The assembled members, if they are to be riveted, are taken to the riveting machines either fixed in position, in which case the piece to be riveted must be moved in order to bring the rivet in the proper position in the riveting machine or the riveter is portable for use on heavy work, and is so arranged that it can be moved about as the rivets are driven. In driving rivets it is frequently found that because of inaccuracy of workmanship holes do not come exactly opposite but by driving a drift pin the holes are more nearly brought in line before a rivet is driven. Most of the holes in structural steel work are punched, and after being assembled are then reamed to get a smoother and larger hole. On heavier materials or parts where the best results are desired, holes are drilled.

Again, in contrast to the above, in the welded structure

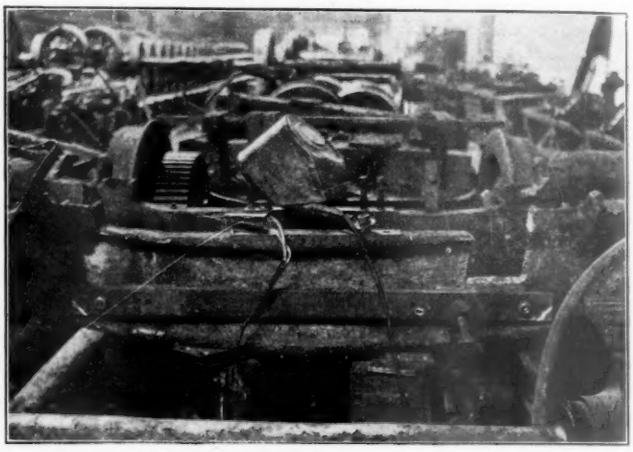


Frame Structures Made of Scrap Pipe by Welding. This Money-Saving Application of Welding Has Been Used in Many Sections of the Country for Many Types of Small Buildings

the parts to be fastened are held together temporarily by small "tack welds," requiring only a minute or two to make or by suitable clamps. There are no holes to align, and welding progresses steadily from one end of the seam to the other.

As a general proposition, the riveted or bolted joint has a tensile strength considerably less than the original piece, whereas the welded joint may be made as strong as the original section. Moreover, the welded joint is oil and watertight up to its breaking point, while the riveted and caulked joints leak badly at as low as 25 per cent of the ultimate strength.

Everything considered, it is conservative to state that in most cases the fabrication of steel by welding can be done with a saving of 25 per cent over that of the riveting and with a better quality of product. A saving may not be effected in the first structure, but will undoubtedly be brought about as familiarity with the process and its use is attained by designers, draftsmen and workmen. It should be also pointed out that in some instances the superiority of the finished product would justify the use of welding even though it cost several times that of riveting. A striking example of this is in the construction of oil storage tanks for



Cast Steel Truck Welded for New York Subway

lighter oils. The present riveted structure is not sufficiently tight for holding these oils, and the savings which would be effected by prevention of the loss of oil from leakage and evaporation would in two years pay entirely the cost of the welded tank. Welding has also recently been used in the fabrication of some large gas holders with a saving in cost and improvement in quality of product.

Arc Welding

Steel companies with vision are already preparing for the time when arc welding will supplant the rivet, and they are gaining experience in its use upon the smaller welded sections, or in minor operations which do not require approval. A multitude of minor structural firms, and many large ones, have to their great advantage adopted this new tool, as in the automotive industry, the iron and steel works of the country, the engineering and contracting companies, the steam and plumbing industry, including the laying of steam, water and other pipe lines, as well as the two industries that did most to develop the process—the shipbuilding and railway companies.

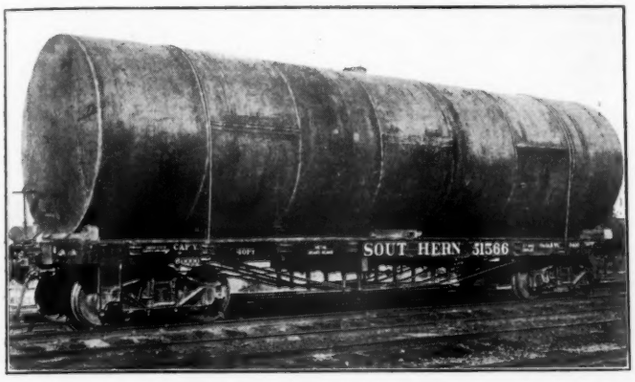
To the railway companies belongs the credit for sponsoring arc welding in its infancy. Some of these companies have made use of the process for more than 15 years, chiefly as a repair utility, and a detailed list of the specific uses to which it has been put would occupy a volume of its own. As experience shows conclusively that joints stand up without failure, more and more of the fireboxes on new locomotives are being welded. It is the standard practice on many railroads to weld all the flues in the firebox end when the locomotive is built and when they are reset. While these flues would, under constant service, ordinarily begin to leak in about three months, they have withstood leakage for three years when welded.

When the war came, and brought with it the necessity of great increase in speed and efficiency in shipbuilding, electric arc welding was provided with a chance to demonstrate its worth. That it came up to all expectations is now

but a matter of record. The shipbuilding industry took over the process as developed by the railroads, and, under the pressing necessity of the nation's need, developed it to a high degree of perfection. This was especially the case in the working out of the fabricated ship idea.

As far as production is concerned there is probably no metal trade or business that will not ultimately come to use arc welding methods, while, for repair work, there is a use for this process everywhere.

In the beginning, the steel industry rather shied at the brilliant light of the arc, and maintained that it could recast broken parts more cheaply than to weld them. Now the recasting is done locally by the aid of the arc. Why recast



One Piece Welded Storage Tank, 120 in. in Diameter, by 40 ft. Long, Built of Welded Construction Throughout. No Seams, nor Joints, nor Rivets. Manhole and All Connections Welded Solid to Shell of Tank

an entire piece, when you only need to recast the metal around the break or defect?

It was obvious logic, and as soon as it was shown that it could be done the steel companies acquired many machines for the purpose.

There is not a steel mill now in which arc welding is not well known, and the most difficult jobs have been easily and satisfactorily accomplished by its aid. They include the padding-up of worn wobblers which are hardened and smoothed at the same time by the use of the carbon arc; water-cooled fire-door repairs; repairs of bearing breakages and rolling stock; repairs from wear and accident, including special locomotive jobs; repair of miscellaneous breakage and wear such as broken gear teeth, worn key-ways, worn armature shafts, misdrilled holes and lack of bosses; in short, a multitude of jobs that can be handled by a "putting-on" tool.

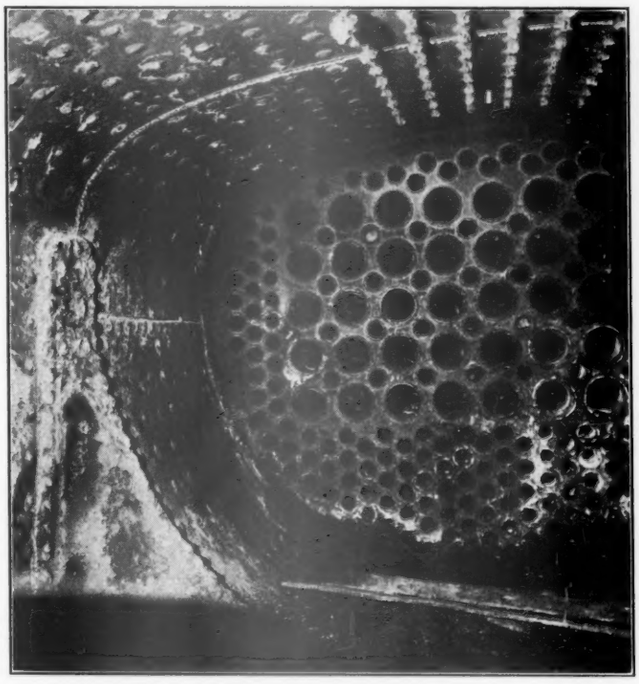
Electric Arc Cutting

Although it is common practice in the steel industry to use gas for cutting, yet there are many places where the electric arc may be used advantageously because of the resulting saving in cost. Arc cutting may be defined as a resultant combination of the melting of metal due to its high temperature, and the oxidation of a portion of this metal by the oxygen of the air. This oxidized portion, because of its lower melting point, acts as a lubricant and tends to slide off the greater masses melted by the heat of the arc.

In arc cutting, gravity must be utilized in that the operation must be performed from the vertical or underside. Many attempts have been made to use oxygen or air under pressure with arc cutting, but it has so far been found impractical to do this. However, the intermittent use of compressed air or oxygen with the arc has been made successful by releasing a stream of air after the arc has made the puddle molten, and by blowing it away upon the oxide lubrication. This method is especially useful in rivet cutting on a top or horizontal surface.

This arc will cut any metal, viz., brass, copper, zinc, lead, cast iron, malleable iron, high carbon or alloy steels, etc. Considering the supply of heat energy necessary, the electric arc process is also cheaper than the gas. Yet, for heavy work, the use of the gas method is the best practice because of the speed possible. Moreover, for heavy and careful work, gas can equal machining methods, for which the electric arc cannot be considered. For rough work, however, such as cutting up scrap into charging sizes, or for work requiring subsequent machining, the electric method is the cheaper, providing the thickness of the piece is not too great. For cutting non-ferrous metals, the arc is thus far superior. The arc will efficiently cut the scrap sections of cars, boilers or tanks into charging sizes, and will rapidly cut through sills, channels, or other stiffening members at a rate proportionate to their thickness, but always at the same low cost of power.

For straight arc cutting, the thickness that can be economically cut by the arc is under six inches, and lies between two inches and six, depending upon the price of power and other considerations. For heavier sections, the speed of



Upper Half of Locomotive Combustion Chamber, Showing Butt Weld on Crown Sheet and Caulking Weld on Side Sheet of Combustion Chamber, All Superheater Pipes and Flues Electrically Arc Welded to Flue Sheet

gas cutting is greater than that of arc cutting, and is the cheaper because of smaller labor costs. There is, however, a method of nicking and breaking in which the electric arc is more efficient than gas for any size material. In any average scrap pile, the work is more economically done by the electric arc; the heavier sections may be nicked and broken, or cut through with gas.

A striking example of economy is found in rivet cutting by the arc. One man with the arc (power cost very small) will cut from one hundred to two hundred rivets an hour.

Part II of this article will deal with oxy-acetylene welding, oxy-acetylene cutting, resistance welding and Thermit welding.

Research Program of the National Transportation Institute

THE RESEARCH COUNCIL of the National Transportation Institute has received from the director of research of the Institute, Dr. David Friday, the first completed research report. This report is now in the hands of the research council and will be released to the public as soon as approved by it. This information was given in the course of an address by J. R. Howard, president of the Institute at the annual convention of the American Farm Bureau Federation at Chicago, December 11.

The report in question, Mr. Howard said, covers an investigation into the growth of production of agriculture, mining, manufactures and railroads during a period of 20 years, from 1900 to 1920.

The investigation, Mr. Howard continued, has had for its purpose the determination of relative output per person and per unit of capital engaged in each of these industries as compared with the others. This investigation will show whether transportation has lagged behind agriculture and manufacturing, and it will permit a comparison of the output from the farms and factories as against the service performed by the railroads. It will show how much capital has been employed in these industries to accomplish the increase in output.

Rate Investigations

Other research projects now in progress, Mr. Howard said, include three investigations into freight rates and a study of land valuations. He gave details of these investigations as follows:

"The study of freight rates divides under three headings, namely:

(1) Construction of a freight rate index.
(2) Apportionment of the total freight bill of the nation to the various industries and commodities and a comparison of the total amount of freight paid on each class of commodity, with the price of the finished article.
(3) A study of export freight rates and ocean freight rates from competitive points in America, Argentine and Australia to Liverpool.

"The study of freight rates is aimed at the construction of a freight rate index which sets forth in a simple comprehensive manner the movement of rates on all important commodities from 1900 to the present time. Such an index number is certain to disclose important facts with respect to the relation of freight rates to prices. The staff of the research council is at present engaged in the preparation of index numbers for freight rates on wheat, flour, cotton and coal. Within a few weeks the investigation will be extended to cover at least 40 commodities.

"This index number is designed to include the freight rate on each commodity through each step of its movement from point of production to the ultimate destination of the manufactured product. The index will be more comprehensive than any attempted in the past, and will check the recent findings of the Department of Agriculture (Year-book 1922) which shows that it took less of the farmer's dollar to pay the freight bill in 1922 than in 1900.

"The results of the first investigation into freight rates will be utilized in the second research project. The latter investigation aims to show not merely the changes in rates per ton over the last 23 years, but seeks to apportion the total freight bill of the nation to the various commodities transported. It will afford a basis of comparison between the total amount of freight paid and the price which the consumer pays for the finished commodity and the price which the producer received for the raw material. There is involved in this problem the apportionment of freight rates on various kinds of material used in the processes of manufacture and in the assembling of the finished product.

"When the freight rate index has been completed and the proportion of freight paid by each commodity has been determined, it will furnish a basis of exact information upon which to base conclusions as to the relative burden of freight rates which each industry bears of the total freight bill. Rational and independent discussion of the problems of shippers, carriers, and the public should be possible with this data available. Partisanship, prejudice, and heated argument should give way to reasoned judgment.

Valuation

"The study of valuations consists of an analysis of the work of the Interstate Commerce Commission in the valuation of railway lands. The findings of the Interstate Commerce Commission are being submitted to analysis which will develop a basis for comparing each parcel of railroad land with the land adjacent to it. The research council is comparing the final values with original costs for the different railroads and is apportioning the value of land to the states through which the railroads run. The land owned by the railroads of each state is then subdivided as between rural land located outside of cities and villages, and urban land. The urban land has been further grouped according to the size of the various towns and cities. The census reports are taken as a guide in comparing the value of the rural land in each state and country with the value of the farm lands of the same localities.

"When this study of land value has been completed the National Transportation Institute will be in position to inform the people of any section of the United States as to the value which the Interstate Commerce Commission has allowed a railroad for its land in that locality, and to make a comparison between that value and the value of other lands in that community.

"This investigation should give us the facts regarding the amount of land included in the values rendered by the Interstate Commerce Commission and the original cost of the land to the railroads. These values may then be compared with the accrued increase in value of other classes of land, both rural and urban, in each locality. One phase of the work has to do with the determination of increase since 1900 in the valuation of land not owned by the railroads. The whole question of land values bears directly upon the question of railroad credit and the amounts of the security which can be utilized by the railroads for raising new capital. The borrowing power of carriers and the mortgage value of their properties have exactly the same relation to land values as the same factors in reference to other lands.

"The study of marine rates now under way will give the American people their first authentic information on this important subject.

"Platform, Press and Cinema"

"This program of the National Transportation Institute will be expanded from time to time. The findings of its research department will be given to the public through the usual media of the platform, press and cinema. Its by-laws are so drafted that it can never become the instrument of any special interest. It can never either advocate or oppose any legislation. Its purpose is not that of reducing or maintaining rates or compensations. It is concerned with the securing of accurate information for the public about the largest property investment in America. It is not planned to meet any temporary need, but as a permanent and enduring institution. Already the matter of permanent endowments is contemplated. It is only concerned with facts. It recognizes the needs of transportation in every form. It is not concerned with a highway policy or a railroad policy or a marine policy, but rather a national policy in which the highway and railway and shipway are properly co-ordinated."

General News Department

Train Dispatching by Radio

The Southern Pacific on December 7 directed the operation of trains on its Coos Bay branch by radio, sending orders from the government radio station at Marshfield, Ore., to the government radio station on Puget Sound and from there to Eugene by Western Union telegraph. This expedient was adopted because of a storm which caused all wires to fail.

Western Railway Club; Locomotive Scheduling

The regular monthly meeting of the Western Railway Club was held on Monday, December 17, at the Auditorium hotel, Chicago, the subject for discussion being "Locomotive Scheduling and Control," by L. C. Bowes, production engineer of the Rock Island. Mr. Bowes is one of the authors of a five-part article on locomotive scheduling at the Silvis shops, published in recent issues of the Railway Mechanical Engineer, and the fundamental principles outlined in this article were presented in the paper of the evening. A drawing of the master schedule board used at Silvis was shown and Mr. Bowes made it very clear how this board in conjunction with the schedule control system visualizes shop activities, relieves foremen of detail work, enables shop departments to be balanced and in a period of six months has reduced man hours per locomotive from 6,500 to 3,600 at Silvis. A feature of the meeting was the lively and extended discussion which followed the reading of the paper. Among others, John Purcell, assistant to the vice-president of the Santa Fe, and H. T. Bentley, general superintendent of motive power of the Chicago & North Western, participated in the discussion.

Commission Reverses Virginian Decision

The Interstate Commerce Commission has reversed its decision of June 25 in which it denied the application of the Virginian for a certificate authorizing the construction of an extension of 1.19 miles to reach a coal mine, on the ground that it had been unable to furnish an adequate supply of cars to the coal mines which it already served. On rehearing the railroad admitted that it had been unable to furnish an adequate car supply during the period covered by the commission's report, but showed that this inability was due to abnormal conditions, including the coal strike and shopmen's strikes; that the deficiency in its service was less than indicated in the commission's report, and that under normal conditions it would have been able to furnish an adequate car supply. The commission reviewed the evidence which the railroad presented to show that it is now in position to serve its mines adequately and found that the public convenience and necessity do require the construction of the extension. The former decision had attracted considerable notice because of the assumption that the commission, having asserted that there were too many coal mines in the country, was endeavoring to reduce the output of coal.

Nickel Plate Offers to Build Lake Port South of Chicago

The New York, Chicago & St. Louis has proposed to the city of Chicago that it will construct the contemplated harbor at Lake Calumet, in the southern part of the city, if it is permitted to lay its tracks around the harbor and to construct a terminal adjacent to it. In the proposed agreement, the road would begin a right-of-way approximately 100 ft. wide, around the harbor in return for which it would construct and operate the railroad and harbor terminal facilities, reclaim certain of the harbor lands and construct a part of the harbor basin. It is said that several roads have made similar proposals but the Nickel Plate is the only one which has submitted a formal offer. The Nickel Plate is reported to have bought more than 400 acres of land some months ago, which it is said to plan to use for freight yards. In the proposed agreement, the right to construct a line from the yards to the harbor is also included. The line around the harbor would be called the Lake Calumet & Harbor Railroad.

Opposition to the Nickel Plate's plan was voiced by the commissioner of public works of Chicago, who said that he opposed permitting any one company to secure exclusive rights to rail transportation at the harbor. He suggested that the harbor road should be built and operated by several companies under a plan of joint ownership.

Chicago City Officials Push New Terminal Plan

Mayor Dever and Commissioner of Public Works Sprague of Chicago are bringing the pressure of the city's administration to bear upon the railroads now using the Dearborn, the La Salle and the Grand Central terminals in that city, to secure approval, by a sufficient number of roads, of plans which have been prepared calling for one large terminal to take the place of the three existing ones. In conference with officers of the New York Central, Mr. Sprague received assurance that that road would give the city full support in the construction of an adequate terminal and in relieving street traffic congestion now existing in the streets south of the Chicago loop. An urgent invitation has been sent to Daniel Willard, president of the Baltimore & Ohio, by Mayor Dever, asking him to come to Chicago on January 4 or 5 and discuss plans submitted by the New York Central. Four plans have been prepared by the latter road at the suggestion of the city's railway terminal commission for preliminary consideration. These were developed by Alfred Fellheimer and Steward Wagner, New York architects and engineers, and by O. S. Payzant, their associate. All of the four plans provide for a headhouse fronting on Harrison street. They differ only in their width, one providing for 42 tracks occupying the entire space between Franklin and La Salle streets and another occupying the space between La Salle and Wells streets only. In the main, the present plans give little consideration to the building proper. Instead they are studies of the land area affected, and of how, in the space available, to provide for a maximum of facilities for the railroad traffic and for the maximum number of thoroughfares for street traffic.

A. R. E. A. Nominations

The nominating committee of the American Railway Engineering Association has presented the following nominations which will go upon ballots to be distributed in the near future:

For president, G. J. Ray, chief engineer, D. L. & W.

For vice-president (one to be elected), C. F. W. Felt, chief engineer, A. T. & S. F., and E. B. Temple, assistant chief engineer, Penna.

For directors (three to be elected), A. F. Blaess, engineer maintenance of way, I. C.; F. L. C. Bond, chief engineer, Central region, C. N. R.; A. M. Burt, assistant to vice-president, operation, N. P.; W. D. Faucette, chief engineer, S. A. L.; C. E. Johnston, general manager, K. C. S.; W. H. Kirkbride, engineer maintenance of way and structures, S. P.; I. V. Neubert, engineer maintenance of way, N. Y. C.; H. L. Ripley, valuation engineer, N. Y., N. H. & H., and W. P. Wiltsee, acting chief engineer, N. & W.

For nominating committee (five to be elected), M. C. Blanchard, chief engineer Western lines, A. T. & S. F.; W. J. Burton, assistant valuation engineer, M. P.; C. C. Cook, maintenance engineer, B. & O.; R. H. Ford, assistant chief engineer, C. R. I. & P.; C. R. Harding, consulting engineer, S. P.; Frank Lee, engineer maintenance of way, C. P. R.; A. Montzheimer, chief engineer, E. J. & E.; A. R. Raymer, chief engineer, P. & L. E.; A. H. Rudd, chief signal engineer, Penna., and J. E. Willoughby, chief engineer, A. C. L.

Operating Statistics of Large Steam Roads—Selected Items for the Month of October, 1923,

Region, road and year	Average miles of road operated	Train-miles	Locomotive-miles: Principal and helper	Locomotive-miles: Light	Car-miles: Loaded (thousands)	Car-miles: Per cent loaded	Ton-miles (thousands): Gross, Excluding locomotive and tender	Ton-miles (thousands): Net, Revenue and non-revenue	Average number of locomotives on line daily: Serviceable	Unserviceable	Per cent unserviceable	Stored
New England Region:												
Boston & Albany	1923 394	292,339	313,374	35,083	5,961	70.4	305,085	125,927	114	32	22.0	...
	1922 394	311,458	330,002	31,598	5,803	72.5	295,603	126,328	109	33	23.1	...
Boston & Maine	1923 2,455	625,138	694,659	62,793	14,527	72.5	735,674	310,083	346	126	26.6	16
	1922 2,455	648,629	727,658	69,209	14,611	73.3	733,237	309,618	316	134	29.8	12
N. Y., New H. & Hartf.	1923 1,974	536,207	564,017	40,161	13,451	72.2	676,923	297,901	304	80	20.9	7
	1922 1,973	477,356	517,941	36,405	12,904	77.1	626,803	284,891	279	88	24.1	4
Great Lakes Region:												
Delaware & Hudson	1923 886	403,896	553,520	49,208	11,205	68.2	712,255	375,175	248	53	17.7	31
	1922 887	368,416	503,554	40,347	9,604	67.1	629,985	328,634	250	61	19.5	62
Del., Lack. & Western	1923 993	635,317	766,887	119,013	19,981	68.0	1,115,456	501,474	280	67	19.4	2
	1922 994	487,529	609,938	122,159	13,653	65.2	830,446	394,632	254	110	30.3	3
Erie (inc. Chic. & Erie)	1923 2,309	1,147,991	1,286,834	93,237	42,551	68.3	2,481,659	1,116,629	687	137	16.6	96
	1922 2,309	940,719	1,066,527	53,575	35,314	73.4	2,035,631	983,870	456	295	39.3	1
Lehigh Valley	1923 1,317	705,177	781,356	97,517	20,572	67.9	1,240,863	608,595	420	106	20.2	32
	1922 1,317	490,537	542,202	65,522	12,470	67.6	780,592	400,235	307	236	43.4	10
Michigan Central	1923 1,827	612,552	627,011	26,051	19,720	68.0	1,031,767	421,378	339	51	13.2	51
	1922 1,827	579,701	587,854	28,645	21,309	74.1	1,023,399	459,999	278	120	30.1	26
New York Central	1923 6,469	2,348,678	2,663,677	199,198	86,142	65.7	5,074,450	2,266,964	1,375	392	22.2	328
	1922 6,468	2,437,580	2,742,677	216,348	91,877	70.1	5,326,063	2,551,020	1,035	712	40.8	11
New York, Chic. & St. L.	1923 1,670	778,024	791,870	3,248	21,809	70.0	1,150,079	474,391	216	68	24.0	4
	1922 1,670	760,768	770,724	4,499	20,007	73.8	1,065,044	474,219	210	82	27.9	11
Pere Marquette	1923 2,197	464,322	491,756	10,529	11,688	73.0	622,035	318,841	192	26	11.9	7
	1922 2,182	359,251	366,146	7,404	9,565	76.5	489,647	238,499	151	59	28.2	...
Pitts. & Lake Erie	1923 231	156,712	160,185	1,087	5,888	65.2	436,325	261,033	73	16	17.5	11
	1922 228	150,708	157,482	1,180	5,597	68.3	395,694	236,509	60	19	24.4	...
Wabash	1923 2,418	732,572	770,498	17,641	21,419	72.8	1,118,266	472,231	284	55	16.2	...
	1922 2,418	529,410	551,485	7,668	16,556	79.0	854,844	412,227	248	95	27.6	...
Ohio-Ind.-Allegheny Region:												
Baltimore & Ohio	1923 5,212	2,171,044	2,493,412	208,201	61,230	65.9	3,750,313	1,850,128	1,111	169	13.2	77
	1922 5,235	1,939,187	2,226,668	144,315	57,669	72.2	3,315,362	1,699,628	999	350	25.9	...
Central of New Jersey	1923 694	298,479	328,524	41,624	7,591	63.9	476,463	235,721	230	49	17.5	29
	1922 692	329,347	361,322	44,782	7,686	64.7	487,241	243,755	213	46	17.6	4
Chicago & Eastern Ill.	1923 945	253,195	256,300	4,287	7,079	65.6	418,272	207,958	130	46	26.1	34
	1922 945	223,493	225,169	4,509	5,905	69.7	342,417	177,610	91	81	47.1	4
Cleve., Cin., Chic. & St. L.	1923 2,377	773,508	809,727	9,075	24,499	64.2	1,542,898	754,006	357	85	19.3	35
	1922 2,378	699,583	721,563	5,918	22,571	68.7	1,351,893	675,898	267	181	40.3	...
Elgin, Joliet & Eastern [1]	1923 460	133,026	146,830	7,767	4,063	66.5	307,626	166,797	86	15	14.8	1
	1922 459	132,079	144,812	7,813	3,940	65.8	318,282	176,262	84	22	20.4	12
Long Island	1923 393	48,867	58,384	9,498	675	61.8	39,543	15,989	39	14	26.4	...
	1922 394	51,897	61,422	11,026	720	63.4	41,031	16,761	37	12	25.1	...
Pennsylvania System	1923 10,907	5,134,844	5,577,010	418,058	141,790	66.4	9,249,635	4,638,163	2,948	533	15.3	135
	1922 10,902	5,008,137	5,517,025	413,075	136,576	68.9	8,846,918	4,600,583	2,464	832	25.3	10
Philadelphia & Reading	1923 1,117	679,773	752,413	78,358	17,715	67.2	1,134,779	603,543	323	111	25.6	39
	1922 1,119	672,840	766,631	96,407	18,075	69.0	1,160,224	627,932	363	67	15.5	87
Pocahontas Region:												
Chesapeake & Ohio	1923 2,553	1,015,544	1,119,884	24,596	30,656	58.5	2,371,404	1,287,835	435	105	19.5	15
	1922 2,551	640,628	706,176	16,439	20,497	63.3	1,460,288	807,445	361	169	31.8	10
Norfolk & Western	1923 2,228	921,723	1,151,788	34,029	27,178	60.4	2,105,234	1,128,646	561	125	18.2	61
	1922 2,228	754,750	970,918	35,363	19,502	61.3	1,508,185	817,277	543	172	24.1	46
Southern Region:												
Atlantic Coast Line	1923 4,861	705,469	710,918	10,599	17,747	68.4	900,704	373,132	363	59	14.1	62
	1922 4,930	666,901	669,993	11,007	16,322	73.3	806,568	354,009	330	102	23.6	13
Central of Georgia	1923 1,907	299,530	303,227	5,364	6,472	75.7	324,282	148,304	128	18	12.5	5
	1922 1,907	272,597	276,559	5,552	5,775	77.5	290,455	137,467	117	16	12.0	...
I. C. (inc., Y. & M. V.)	1923 6,190	1,992,551	2,014,015	42,491	56,158	64.0	3,469,403	1,557,191	741	123	14.2	...
	1922 6,135	2,110,301	2,125,006	50,384	60,786	66.5	3,724,575	1,760,248	731	91	11.1	6
Louisville & Nashville	1923 5,032	1,829,904	1,939,891	70,632	33,688	61.7	2,190,536	1,057,682	622	84	11.9	...
	1922 5,021	1,504,859	1,606,073	62,373	27,852	68.3	1,671,219	827,877	528	159	23.2	...
Seaboard Air Line	1923 3,553	509,415	522,554	9,507	11,984	72.0	611,913	259,449	207	40	16.1	1
	1922 3,537	496,469	501,924	10,385	11,044	74.0	562,840	248,801	172	104	37.6	...
Southern	1923 6,942	1,559,296	1,605,146	36,206	36,669	72.6	1,874,531	832,370	792	135	14.6	...
	1922 6,942	1,524,761	1,574,525	47,686	33,941	73.5	1,739,820	783,578	798	245	23.5	...
Northwestern Region:												
Chic. & N. W.	1923 8,463	1,853,573	1,950,107	28,138	44,265	65.3	2,522,640	1,057,679	893	177	16.5	34
	1922 8,393	1,855,536	1,942,998	27,692	43,344	69.2	2,451,427	1,031,502	729	299	29.1	...
Chic., Milw. & St. Paul	1923 11,002	1,950,905	2,017,722	74,571	52,159	66.7	2,900,775	1,303,569	948	165	14.9	81
	1922 11,027	1,955,512	2,009,658	82,504	49,458	67.3	2,806,376	1,333,204	804	276	25.5	29
Chic., St. P., M. & O.	1923 1,726	374,163	401,927	16,908	7,619	71.1	398,931	167,896	164	44	21.1	6
	1922 1,726	330,852	355,179	16,223	6,519	76.3	342,339	154,594	145	71	32.9	16
Great Northern	1923 8,251	1,499,874	1,552,912	71,822	45,144	64.8	2,736,597	1,246,100	646	105	14.0	28
	1922 8,255	1,187,054	1,217,445	49,035	33,468	67.2	1,973,539	964,535	549	214	28.0	11
M., St. P. & S. Ste. M.	1923 4,374	636,926	648,948	12,240	15,494	72.2	805,626	387,689	294	50	14.4	3
	1922 4,355	707,274	719,410	12,403	14,746	76.6	849,730	425,697	292	59	16.9	2
Northern Pacific	1923 6,415	1,151,375	1,204,675	67,987	34,031	64.6	2,005,560	860,070	600	135	18.4	31
	1922 6,388	1,050,906	1,090,418	53,982	29,038	74.7	1,586,375	771,614	564	154	21.5	44
Ore.-Wash. R. R. & Nav. Co.	1923 2,180	283,558	305,572	34,266	7,314	68.0	431,450	197,035	155	22	12.4	4
	1922 2,143	266,668	298,115	39,617	6,432	76.2	361,393	187,613	134	38	22.2	...
Central Western Region:												
Atch., Top. & S. Fe	1923 9,905	2,154,412	2,300,050	131,563	63,584	63.0	3,735,931	1,262,054	815	153	15.8	37
	1922 9,798	2,165,633	2,265,106	111,687	61,153	65.2	3,473,643	1,269,485	744	228	23.5	19
Chicago & Alton	1923 1,010	371,815	378,235	6,264	9,248	65.6	543,337	246,554	122	35	22.1	9
	1922 1,010	277,415	281,674	5,865	6,741	72.5	383,672	182,971	91	54	37.2	1
Chic., Burl. & Quincy	1923 9,338	1,917,672	1,987,314	91,685	52,735	65.4	3,041,626	1,393,426	813	189	18.9	39
	1922 9,326	1,935,157	2,018,831	93,986	55,013	65.4	3,279,153	1,568,320	774	242	23.8	1
Chic., Rock Isl. & Pacific	1923 7,635	1,510,168	1,543,778	21,898	35,728	70.4	1,880,847	811,214	541	207	27.6	9
	1922 7,635	1,309,800	1,333,527	20,824	31,476	76.1	1,598,413	740,957	526	200	27.5	19
Denver & Rio Grande Wn.	1923 2,593	407,998	512,985	96,053	8,515	66.9	479,841	210,034	260	77	22.8	1
	1922 2,593	332,451	402,025	76,695	7,065	65.9	413,754	190,652	224	109	32.6	2
Oregon Short Line	1923 2,367	557,128	584,201	36,955	12,898	61.1	819,126	340,770	211	32	13.1	18
	1922 2,367	509,070	531,445	35,724	11,126	65.6	682,439	309,969	187	51	21.4	4
Southern Pacific (P. Sys.)	1923 6,943	1,639,898	1,838,174	316,482	47,867	68.9	2,702,553	1,053,347	665	124	15.7	3
	1922 6,924	1,361,526	1,538,656	278,886	40,645	71.9	2,222,311	962,874	635	190	23.0	6
Union Pacific	1923 3,709	1,867,789	1,918,358	115,081	52,569	62.3	3,081,364	1,087,019	520	59	10.2	37
	1922 3,707	1,655,648	1,693,517	133,559	46,337	69.3	2,521,671	1,026,797	458	122	21.1	13
Southwestern Region:												
Gulf, Colo. & S. Fe	1923 1,897	306,551	315,771	7,921	8,517	67.2	466,974	199,219	119	23	16.3	3
	1922 1,895	271,965	279,020	6,116	7,759	71.0	406,455	176,768	119	30	20.1	3
Missouri-Kansas-Texas	1923 1,801	280,028	280,314	10,022	9,057	65.8	487,401	196,406	156	48	23.5	59
	1922 1,987	334,375	334,969	6,855	9,558	69.5	508,733	220,677	103	96	48.3	7
Mo.-Kans.-Tex. of Texas	1923 1,389	209,243	214,835	4,961	5,336	66.4	284,619	111,560	90	37	29.3	12
	1922 1,738	244,767	249,962	3,145	5,235	73.6	265,505	113,769	75	68	47.6	4
Missouri Pacific	1923 7,305	1,354,275	1,363,271	38,705	34,013	68.3	1,896,017	839,528	461	172	27.2	...
	1922 7,112	1,041,157	1,049,730	35,076	25,514	73.3	1,385,042	651,747	378	217	36.5	...
St. Louis-San Francisco	1923 4,683	925,071	940,806	19,429	18,617	68.4	1,018,608	444,601	383	113	22.8	13
	1922 4,683	735,846	743,228	13,781	13,092	70.2	709,413	319,147	307	154	33.5	...
Southern Pacific Lines (in Texas and Louisiana) [2]	1923 3,710	698,060	700,348	7,555	16,399	69.3	911,533	393,362	233	60	20.5	20
	1922 3,710	618,597	621,534	7,673	14,045	69.4	763,315	338,066	186	106	36.2	2
Texas & Pacific	1923 1,953	307,808	308,133	2,927	7,701	69.6	405,632	168,082	160	38	19.0	29
	1922 1,953	250,955	250,995	6,995	6,505	72.5	332,398	139,679	103	96	48.4	6

[1] No passenger-train service.

Compiled by the Bureau of Statistics Interstate Commerce Commission. Subject to revision.

Compared with October, 1922, for Roads with Annual Operating Revenues above $25,000,000.

Region, road and year	Average number of freight cars on line daily: Home	Foreign	Total	Per cent unserviceable	Stored	Gross tons per train, excluding locomotive and tender	Net tons per train	Net tons per loaded car	Net ton-miles per car-day	Car-miles per car-day	Net ton-miles per mile of road per day	Pounds of coal per 1,000 gross ton-miles including locomotive and tender	Passenger service: Train-miles	Passenger-train car-miles
New England Region:														
Boston & Albany	1923	1,906	6,982	8,888	3.3	....	1,044	431	21.1	457	30.7	10,312	197	308,188	1,981,598
	1922	1,801	7,169	8,970	4.1	....	949	406	21.8	454	28.8	10,345	227	302,243	1,931,014
Boston & Maine	1923	13,330	19,476	32,806	11.1	....	1,177	496	21.3	305	19.7	4,074	154	842,624	4,519,081
	1922	13,521	21,290	34,811	13.6	....	1,130	477	21.2	287	18.5	4,068	172	806,689	4,376,381
N. Y., New H. & Hartf.	1923	19,184	19,578	38,762	19.6	....	1,262	556	22.1	248	15.5	4,868	162	1,031,458	6,625,900
	1922	18,402	30,837	49,239	18.9	73	1,313	597	22.1	187	11.0	4,658	196	1,004,246	6,380,045
Great Lakes Region:															
Delaware & Hudson	1923	8,776	7,891	16,667	5.1	....	1,763	929	33.5	726	31.8	13,654	195	196,160	1,048,434
	1922	8,261	9,441	17,702	7.9	....	1,710	892	34.2	599	26.1	11,952	208	190,857	996,788
Del., Lack. & Western	1923	13,070	12,653	25,723	3.9	....	1,756	789	25.1	629	36.8	16,290	178	495,039	3,710,097
	1922	10,406	12,052	22,458	6.3	30	1,703	809	28.9	567	30.1	12,806	210	485,302	3,505,864
Erie (inc. Chic. & Erie)	1923	22,948	27,307	50,255	7.4	....	2,162	973	26.2	717	40.0	15,597	132	688,054	5,529,898
	1922	23,739	37,712	61,451	11.9	2,992	2,164	1,046	27.9	516	25.3	13,743	144	574,647	4,113,358
Lehigh Valley	1923	19,952	13,682	33,634	4.8	....	1,760	863	29.6	584	29.1	14,908	167	353,648	2,749,512
	1922	23,879	17,463	41,342	7.6	....	1,591	816	32.1	312	14.4	9,805	215	346,000	2,653,924
Michigan Central	1923	9,332	20,345	29,677	4.3	....	1,684	688	21.4	458	31.5	7,442	130	628,397	5,801,342
	1922	8,204	21,818	30,022	10.3	....	1,765	794	21.6	494	30.9	8,124	133	569,365	5,403,952
New York Central	1923	49,022	91,183	140,205	6.0	....	2,161	965	26.3	522	30.2	11,305	124	2,662,968	22,174,009
	1922	55,101	90,886	145,987	11.7	....	2,185	1,047	27.8	564	29.0	12,724	129	2,464,818	20,148,998
New York, Chic. & St. L.	1923	7,645	13,932	21,577	7.1	....	1,478	610	21.8	709	46.5	9,166	138	214,748	1,170,152
	1922	3,712	15,292	19,004	12.8	....	1,400	623	23.7	805	46.0	9,163	140	216,481	1,075,743
Pere Marquette	1923	6,664	17,183	23,847	3.3	....	1,340	687	27.3	431	21.7	4,681	143	270,365	1,422,708
	1922	6,642	17,361	24,003	12.7	....	1,363	664	24.9	321	16.8	3,526	151	259,162	1,300,019
Pitts. & Lake Erie	1923	7,622	12,614	20,236	3.7	....	2,784	1,666	44.3	416	14.4	36,419	75	119,813	612,017
	1922	10,788	11,180	21,968	31.6	....	2,626	1,569	42.3	347	12.0	33,474	77	115,664	558,726
Wabash	1923	9,154	14,575	23,729	2.1	....	1,526	645	22.0	642	40.0	6,300	152	510,133	2,958,132
	1922	6,956	15,679	22,635	8.8	....	1,615	779	24.9	587	29.9	5,500	155	409,968	2,502,792
Ohio-Ind.-Allegheny Region:															
Baltimore & Ohio	1923	55,037	48,636	103,673	4.6	....	1,727	852	30.2	576	28.9	11,451	186	1,550,859	10,274,448
	1922	50,370	61,491	111,861	12.6	....	1,710	876	29.5	490	23.0	10,473	195	1,237,585	8,269,478
Central of New Jersey	1923	13,138	12,946	26,084	9.8	....	1,596	790	31.1	292	14.7	10,951	177	354,942	1,663,480
	1922	12,354	15,479	27,833	6.2	....	1,479	740	31.7	283	13.8	11,368	201	336,585	1,631,829
Chicago & Eastern Ill.	1923	11,550	5,450	17,000	15.8	....	1,652	821	29.4	395	20.5	7,098	177	232,592	1,479,975
	1922	9,075	6,045	15,120	19.3	....	1,532	795	30.1	379	18.1	6,062	186	191,488	1,220,948
Cleve., Cin., Chic. & St. L.	1923	11,241	24,841	36,082	6.4	....	1,995	975	30.8	674	34.1	10,234	126	745,452	4,500,719
	1922	9,721	28,173	37,894	12.2	....	1,932	966	29.9	575	27.9	9,169	136	643,173	4,149,283
Elgin, Joliet & Eastern [1]	1923	9,136	7,558	16,694	6.7	....	2,313	1,254	41.1	322	11.8	11,704	118	.....	.....
	1922	8,741	5,613	14,354	16.3	....	2,410	1,335	44.7	396	13.5	12,384	122	.....	.....
Long Island	1923	1,295	5,976	7,271	1.3	....	809	327	23.7	71	4.8	1,311	311	212,169	1,247,350
	1922	1,709	4,965	6,674	3.6	....	791	323	23.3	81	5.5	1,372	291	197,539	1,161,785
Pennsylvania System	1923	169,456	118,491	287,947	4.4	3,880	1,801	903	32.7	520	23.9	13,718	150	5,177,602	36,044,711
	1922	149,406	147,842	297,248	9.9	1,551	1,767	919	33.7	499	21.5	13,613	161	5,126,476	35,978,606
Philadelphia & Reading	1923	15,219	19,161	34,380	3.4	....	1,669	888	34.1	566	24.7	17,426	179	523,629	2,524,356
	1922	13,400	20,773	34,173	4.3	....	1,724	933	34.7	593	24.7	18,108	178	503,924	2,292,814
Pocahontas Region:															
Chesapeake & Ohio	1923	25,692	14,700	40,392	4.3	....	2,335	1,268	42.0	1,028	41.9	16,273	128	475,553	2,744,315
	1922	30,500	21,546	52,046	12.8	....	2,280	1,260	39.4	501	20.1	10,212	155	441,171	2,538,743
Norfolk & Western	1923	24,565	12,781	37,346	4.4	....	2,284	1,224	41.5	975	38.8	16,339	187	415,342	2,624,899
	1922	24,369	14,238	38,607	3.9	....	1,998	1,083	41.9	683	26.6	11,834	224	397,036	2,501,111
Southern Region:															
Atlantic Coast Line	1923	13,895	14,565	28,460	4.3	....	1,277	529	21.0	423	29.4	2,476	128	732,934	4,729,793
	1922	11,233	13,906	25,139	16.7	....	1,209	531	21.7	454	28.6	2,316	128	701,831	4,402,903
Central of Georgia	1923	2,331	5,512	7,843	4.9	....	1,083	495	22.9	610	35.2	2,509	157	321,381	1,627,678
	1922	1,640	5,819	7,459	7.7	....	1,066	504	23.8	595	32.2	2,326	182	323,009	1,603,678
I. C. (inc., Y. & M. V.)	1923	34,486	34,766	69,252	5.3	1,893	1,741	782	27.7	725	40.9	8,115	141	1,516,126	8,997,717
	1922	24,505	39,886	64,391	6.0	22	1,765	834	29.0	882	45.8	9,256	144	1,497,501	9,021,851
Louisville & Nashville	1923	32,477	23,013	55,490	8.1	60	1,197	578	31.4	615	31.8	6,780	181	1,052,367	6,119,846
	1922	21,798	24,359	46,157	12.0	41	1,111	550	29.7	579	28.5	5,319	179	1,023,588	5,995,597
Seaboard Air Line	1923	8,246	11,005	19,251	15.4	....	1,201	509	21.6	435	27.9	2,356	159	552,126	3,402,980
	1922	9,933	13,990	23,923	29.7	....	1,134	501	22.5	336	20.1	2,269	179	488,235	3,112,460
Southern	1923	28,551	30,596	59,147	3.4	....	1,202	534	22.7	454	27.6	3,868	188	1,312,156	8,082,147
	1922	24,356	40,117	64,473	17.6	....	1,141	514	23.1	392	23.1	3,641	214	1,274,662	7,371,772
Northwestern Region:															
Chic. & N. W.	1923	42,552	36,306	78,858	7.5	....	1,361	571	23.9	433	27.7	4,032	151	1,600,897	10,231,688
	1922	34,956	41,720	76,676	8.6	....	1,321	556	23.8	434	26.4	3,965	171	1,384,339	9,519,828
Chic., Milw. & St. Paul	1923	49,401	32,377	81,778	7.0	....	1,487	668	25.0	514	30.9	3,822	151	1,504,136	9,321,290
	1922	39,034	36,941	75,975	14.4	....	1,435	682	27.0	566	31.2	3,900	160	1,467,923	9,162,285
Chic., St. P., M. & O.	1923	3,502	9,804	13,306	8.9	1,088	1,066	449	22.0	407	26.0	3,137	161	311,937	1,784,561
	1922	3,020	8,729	11,749	10.6	7	1,035	467	23.7	424	23.5	2,889	176	271,877	1,715,449
Great Northern	1923	42,291	20,401	62,692	7.0	....	1,825	831	27.6	641	35.8	4,872	133	982,424	5,928,239
	1922	37,337	11,496	48,833	7.1	....	1,663	813	28.8	637	32.9	3,769	160	933,146	5,891,293
M., St. P. & S. Ste. M.	1923	18,870	8,299	27,169	6.3	1,616	1,265	609	25.0	460	25.5	2,859	119	445,063	2,520,603
	1922	16,200	7,699	23,899	7.2	985	1,201	602	28.9	575	26.0	3,153	124	424,046	2,495,551
Northern Pacific	1923	31,272	14,857	46,129	6.7	....	1,742	747	25.3	601	36.8	4,325	123	815,772	5,711,027
	1922	25,846	9,681	35,527	12.3	....	1,510	734	26.6	701	35.3	3,896	135	793,697	5,356,283
Ore.-Wash. R.R. & Nav. Co.	1923	5,975	6,452	12,427	3.7	....	1,522	695	26.9	511	27.9	2,915	217	247,427	1,678,003
	1922	4,689	3,179	7,868	3.2	....	1,355	704	29.2	769	34.6	2,824	242	256,290	1,703,773
Central Western Region:															
Atch., Top. & S. Fe	1923	44,868	20,235	65,103	4.8	3,345	1,734	586	19.8	625	50.0	4,110	141	1,806,707	14,718,171
	1922	35,809	28,403	64,212	5.3	173	1,604	586	20.8	638	47.1	4,180	147	1,665,064	13,487,397
Chicago & Alton	1923	6,784	8,754	15,538	7.2	....	1,461	663	26.7	512	29.3	7,873	156	296,081	1,860,499
	1922	6,150	7,268	13,418	9.3	....	1,383	660	27.1	440	22.4	5,842	201	238,873	1,525,600
Chic., Burl. & Quincy	1923	42,891	28,684	71,575	4.8	636	1,586	727	26.4	628	36.4	4,814	169	1,547,595	10,296,606
	1922	34,419	37,294	71,713	7.5	....	1,695	810	28.5	705	37.8	5,425	165	1,467,137	9,812,047
Chic., Rock Isl. & Pac.	1923	26,670	29,027	55,697	7.3	1,907	1,245	537	22.7	470	29.4	3,427	176	1,274,851	7,367,375
	1922	21,492	22,825	44,317	14.3	101	1,220	566	23.5	539	30.1	3,131	184	1,264,737	7,351,633
Denver & R. G. Wn.	1923	12,340	6,729	19,069	4.4	1,891	1,176	515	24.7	355	21.5	2,613	254	261,759	1,975,214
	1922	10,175	5,653	15,828	11.0	14	1,245	573	27.0	389	21.8	2,372	245	229,719	1,672,263
Oregon Short Line	1923	7,983	6,261	14,244	6.0	....	1,470	612	26.4	772	47.8	4,644	153	278,037	2,072,240
	1922	5,847	5,092	10,939	4.9	....	1,341	609	27.9	914	50.0	4,224	158	282,368	2,132,146
Southern Pac. (P. Sys.)	1923	20,126	27,081	47,207	4.9	....	1,647	643	22.0	720	47.3	4,897	145	1,511,232	12,297,700
	1922	19,734	19,441	39,175	6.6	....	1,632	707	23.7	793	46.0	4,486	153	1,360,508	11,306,057
Union Pacific	1923	17,469	13,315	30,784	6.0	....	1,650	582	20.7	1,139	88.5	9,455	147	898,755	7,724,723
	1922	11,695	14,614	26,309	4.7	26	1,523	620	22.2	1,259	82.0	8,934	166	870,175	7,438,227
Southwestern Region:															
Gulf, Colo. & S. Fe	1923	6,652	6,269	12,921	2.9	279	1,523	650	23.4	497	31.7	3,388	114	196,199	1,249,476
	1922	5,366	6,595	11,961	3.9	26	1,495	650	22.8	477	29.5	3,010	146	197,632	1,179,615
Missouri-Kansas-Texas	1923	9,274	7,168	16,448	5.8	....	1,741	701	21.7	385	27.0	3,518	129	256,674	1,910,402
	1922	7,080	10,440	17,520	7.7	....	1,521	660	23.1	406	25.3	3,582	147	268,568	2,082,646
Mo.-Kans.-Tex. of Texas	1923	321	11,195	11,516	14.8	....	1,360	533	20.9	312	22.5	2,590	149	251,040	1,596,027
	1922	339	11,911	12,250	7.6	....	1,085	465	21.7	300	18.7	2,112	183	203,808	1,462,376
Missouri Pacific	1923	20,347	29,040	49,387	6.9	....	1,400	620	24.7	548	32.5	3,707	152	1,064,910	6,147,237
	1922	19,965	31,394	51,359	9.6	....	1,330	626	25.5	409	21.9	2,956	169	820,431	5,095,265
St. Louis-San Francisco	1923	17,733	16,072	33,805	6.3	....	1,101	481	23.9	424	26.0	3,062	179	737,120	4,391,746
	1922	14,699	23,422	38,121	7.0	....	964	434	24.4	270	15.8	2,198	220	661,130	3,815,004
Southern Pacific Lines (in Texas and Louisiana) [2]	1923	6,628	16,793	22,821	4.3	....	1,306	564	24.0	556	33.4	3,420	125	549,868	3,885,346
	1922	5,411	16,343	21,784	6.2	....	1,234	547	24.1	501	30.0	2,939	134	547,810	3,614,274
Texas & Pacific	1923	3,728	9,578	13,306	7.3	....	1,318	546	21.8	407	26.8	2,777	143	290,850	2,034,669
	1922	3,965	10,261	14,226	14.5	....	1,325	557	21.5	317	20.3	2,307	176	284,155	1,857,132

[2] Includes Galveston, Harrisburg & San Antonio, Houston & Shreveport, Houston & Texas Central, Houston East & West Texas, Iberia & Vermillion, Lake Charles & Northern, Louisiana Western, Morgan's La. & Tex. R. R. & S. S. Co., and Texas & New Orleans.

Railway Revenues and Expenses for October

The Interstate Commerce Commission's summary of revenues and expenses of the Class I roads for October and 10 months of 1923 follows:

	October		10 months	
	1923	1922	1923	1922
Average number of miles operated...	235,801.42	233,605.04	235,761.41	235,745.66
Revenues:				
Freight	$441,661,079	$406,380,144	$3,884,407,078	$3,255,164,496
Passenger	93,778,383	90,169,984	959,494,240	892,991,764
Mail	7,732,843	7,532,265	75,989,270	74,120,090
Express	14,264,034	18,685,043	126,601,640	112,786,839
All other transportation	17,943,027	15,256,344	165,652,427	147,147,526
Incidental	11,887,413	10,606,544	112,384,156	94,525,613
Joint facility—Cr..	825,200	876,957	8,357,358	8,296,495
Joint facility—Dr..	224,759	221,158	2,221,137	1,803,051
Railway operating revenues	587,867,220	550,280,123	5,330,665,032	4,583,229,772
Expenses:				
Maintenance of way and structures...	81,747,720	68,957,794	691,013,635	617,538,466
Maintenance of equipment	134,128,989	130,485,765	1,240,265,787	1,024,596,693
Traffic	8,118,922	7,244,806	77,643,932	71,852,547
Transportation	204,333,509	205,920,283	1,971,332,676	1,768,088,353
Miscellaneous operations	4,417,540	4,170,429	42,617,700	39,801,538
General	14,173,162	13,050,858	135,004,840	130,348,695
Transportation for investment—Cr. .	1,054,760	752,198	8,667,043	5,481,560
Railway operating expenses	445,865,082	429,077,737	4,149,211,527	3,646,744,732
Net revenue from railway operations..	142,002,138	121,202,386	1,181,453,505	936,485,040
Railway tax accruals.	29,636,573	27,212,335	277,184,059	255,343,040
Uncollectible railway revenues	146,018	46,579	1,319,968	1,070,413
Railway operating income	112,219,547	93,943,472	902,949,478	680,071,587
Equipment rents—Dr. balance	7,476,568	6,884,288	63,063,619	49,915,297
Joint facility rent—Dr. balance.....	1,809,288	1,922,125	18,355,120	15,635,830
Net railway operating income...	102,933,691	85,137,059	821,530,739	614,620,460
Ratio of expenses to revenues (per cent)	75.84	77.97	77.84	79.57

Death of William Forsyth

William Forsyth, formerly superintendent of motive power of the Northern Pacific and later mechanical engineering editor of the *Railway Age* and associate editor of its successor, the *Railway Age Gazette*, died at Chestnut Hill, Pa., on December 3. Mr. Forsyth was born on July 2, 1852, at Northumberland, Pa., and attended the Polytechnic College of Pennsylvania at Philadelphia from 1868 to 1870. He entered railway service in the latter year as a machinist's apprentice on the Philadelphia & Reading. In 1874 he was employed by the Altoona Iron Company at Altoona, Pa., and a year later he entered the test department of the Pennsylvania at Altoona. Mr. Forsyth remained on this work until 1881 when he was appointed assistant master mechanic of the Pittsburgh, Fort Wayne & Chicago, with headquarters at Fort Wayne, Ind. In 1882, he was appointed mechanical engineer of the Chicago, Burlington & Quincy with headquarters at Aurora, Ill., and in 1898 he was appointed superintendent of motive power of the Northern Pacific, with headquarters at St. Paul, Minn. In 1900, Mr. Forsyth was appointed mechanical engineer for the Pennsylvania Coal Company at Scranton, Pa., and a year later, was appointed associate professor of locomotive and car design at Purdue University. He was appointed mechanical engineering editor of the *Railway Age* in 1903 and upon the consolidation of that paper with the *Railroad Gazette*, was appointed associate editor (mechanical) of the *Railway Age Gazette*. He continued in this capacity until 1911, when he retired.

William Forsyth

Traffic News

The Western Barge Line Company has been formed with headquarters at St. Louis, Mo., to operate barges on the Missouri river between St. Louis, Mo., and Sioux City, Iowa. The new company has plans for four barges and a tow boat.

Daily Car Mileage for October Breaks Records

Freight cars are handled more expeditiously than ever before, according to a memorandum issued by the Bureau of Railway Economics. The average daily movement per car in October was 30.7 miles, which has never been approached for the country as a whole during any month since the compilation of these records began in 1917. Compared with the same month last year this was an increase of 4.1 miles, and with October, 1920, in which year freight traffic was the heaviest in history except for this year, it was an increase of 3.9 miles. It also was an increase of 1½ miles over the average for September, 1923. The average movement per car per day for the first ten months this year was 27.9 miles, compared with 22.9 miles for the corresponding period last year. The average load per freight car in October amounted to 27 tons, or seven-tenths of one ton less than the same month, last year, and two and nine-tenths tons less than in October, 1920.

Sir Henry Thornton Urges More Active Traffic Solicitation

That the full value of the traffic department is not recognized by the managements of American railroads is the opinion of Sir Henry Thornton, president of the Canadian National lines, as expressed in an address before the Traffic Club of Chicago on December 14. The prevailing attitude, he said, is to center attention on the operating department. Efforts are largely concentrated on increasing the efficiency of this great spending department and railway officers take pride in pointing to the economies that are being effected through the perfection of operating methods. But it is futile to try to increase net earnings through a reduction in operating expenses unless gross earnings are to be had in sufficient volume. This fact is apparently overlooked, particularly during periods of financial depression, for even minor indications of reduced business usually lead to a reduction of expenses which requires the traffic department to "freeze up," and largely curtail the selling of transportation.

This prevailing attitude on the part of railroads toward their selling department is in marked contrast to the policy in other fields. The industries, he said, are constantly making efforts to improve the efficiency of their selling forces. Millions are spent in advertising. No pains are spared to enlist the best brains to be had for this work. It is true, he added, that the railroads cannot adopt exactly the same methods. Nevertheless, there are points of similarity which call for serious study of the policies of those who pursue intensive selling campaigns; the railroads must spend more money to get their product, transportation, before the public and urge people to buy it. Among the suggestions which he offered for improvement in the work of the traffic department is a higher level of compensation to traffic men.

The Canadian National provides post cards, available to all employees by which they may note any prospective traffic which is brought to their attention and forward the information to the nearest division freight agent. If only 10 per cent of the cards used in this way actually result in business for the company he feels that the effort will be worth while.

Service, he said, is also a great solicitor. Those classes of employees who are afforded the maximum opportunity for contact with the public, namely, the passenger train crews, the dining car stewards and the sleeping car conductors, have an unusual opportunity to mold public opinion and attract business to the railroads. It is conceded, he stated in closing, that the problems of the railroads today are serious but the real fight begins and ends with the getting of traffic.

Commission and Court News

Interstate Commerce Commission

The commission has again postponed the effective date of its order in the assigned car case to February 1. Oral arguments on the petitions that the order be set aside were heard by the commission on December 17.

State Commissions

The Arizona Corporation Commission on December 10, canceled the lease under which the Arizona Eastern holds possession of the Phoenix & Eastern between Phoenix, Ariz., and Mesa, on the ground that the Southern Pacific, which owns the Phoenix & Eastern, is preventing competition as it also owns the Arizona Eastern, a parallel road between the two cities. The Phoenix & Eastern location is wanted by the Tucson & Tidewater which plans to extend to Phoenix from a connection with the El Paso & Southwestern at Tucson.

Court News

"Legal Liability" of Railroad for Cotton Burned Established as Regards Insurance Policy

A railroad company, having a blanket policy covering all loss from fire on cotton carried within the year for which the railroad was "legally liable," was sued for loss by fire of two cars of cotton. The railroad defended on the theory that the cotton had never come into its possession, and not on the theory, suggested by the insurance company, that an unexecuted bill of lading exempted the carrier from liability for loss by fire, a defense which would have been inconsistent with that made. Judgment being rendered against the railroad it sued the insurance company on the policy, which defended on the ground that the carrier was under no "legal liability" to pay the judgment. The Circuit Court of Appeals, Eighth Circuit, holds that the railroad's legal liability was established by the judgment, and, the insurance company having had an opportunity to defend the action, the judgment was conclusive against it, in the absence of fraud.—Royal Ins. Co. v. St. Louis-San Francisco, 291 Fed. 358.

Contributory Negligence in Violating New York Disk Zone Law

In a crossing accident case where the vital issue was the contributory negligence of the driver of the automobile, who was killed, the question involved the construction of the New York "Disk Sign Law" added to the New York Railroad Law in 1919 (section 53a). On passing the sign, placed 300 ft. from the crossing, the driver must "reduce speed to a safe limit" and "proceed cautiously and carefully with the vehicle under complete control."

The Appellate Division holds that: "The safe limit is a limit at which, with his attention no longer distracted, while controlling and directing his speeding motor car, he may discern the approaching train and stop his car before he is in the danger zone, namely, the track, which, with the overhang of the cars, means a width of only about nine feet." "Cautiously and carefully" means with his senses alert and attentive at all points during the 300 ft. to avoid the danger that exists only at the railroad track. "He has his car under complete control, when, proceeding slowly, carefully and cautiously, the driver himself is in position to immediately use the appliances for stopping quickly, and is prepared to stop before entering the danger zone."

An automobilist who could have seen the train when he was within 18 ft. of the track, though his view was obstructed until he was about 19 ft. from the track, was held guilty of contributory negligence, and judgment on verdict for plaintiff was reversed and complaint dismissed.—Horton v. New York Central, 200 N. Y. Supp. 365.

Labor News

The railroad employees' brotherhoods have made a preliminary application for a charter to establish a co-operative national bank at Portland, Oregon. The bank will have a capitalization of $200,000 with a surplus of $50,000 and it will be administered in the same manner as the other railroad labor banks located in a number of cities throughout the country.

Members of the Federated Shop Crafts formerly employed by the Atchison, Topeka & Santa Fe at Topeka, Kans., who went out on strike on July 1, 1922, have refused to recognize the authority of a bulletin from the railway employees' department of the American Federation of Labor declaring the strike at an end, and have issued a statement declaring that the strike has not been called off. In a vote taken in November by former shop employees over the entire system, the men disapproved the proposal to end the strike.

Strike of Canadian Maintenance Men Threatened

A strike vote is now being taken by members of the United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers employed on the Canadian roads, as reported briefly in the *Railway Age* of December 15. This action is being taken as a result of the refusal of the railway managements to grant the wage increase recommended by the Board of Conciliation and Investigation. Briefly, the board, which consisted of a chairman appointed by the minister of labor and one representative each of the railroads and the employees, unanimously recommended that a wage increase of two cents an hour be granted to maintenance of way employees now receiving less than forty cents an hour and also recommended certain changes in the wage agreement now in effect, including shortening the probationary period from six months to one month. The strike vote is returnable January 15, 1924.

The determination to distribute strike ballots was arrived at in a recent meeting of the joint protective board of the brotherhood and a resolution to that effect was passed which was sent to Honorable James Murdock, minister of labor, Sir Henry Thornton, president of the Canadian National, and T. Moore, president of the Dominion Trades and Labor Congress. The substance of the resolution was that, unless the recommendations of the Board of Conciliation were immediately adopted by the railroads, a vote would be taken to determine if a strike should be called to force the granting of the wage increase.

When the brotherhood first sought wage increases last April, it asked for an advance of five cents an hour, but it has expressed its willingness to accept the recommendation of a two cent increase by the Board of Conciliation. Brotherhood officers stated their belief that the vote now being taken would be strongly in favor of a strike and insistence on the roads' compliance with the original demand for a flat increase of five cents an hour for all classes of employees belonging to the brotherhood.

In refusing to grant the increase recommended, the railway managements issued the following statement: "The board's recommendation to increase by two cents an hour rates of pay for employees receiving less than 40 cents an hour cannot be accepted until some means have been found to secure the increased revenue required to meet the additional expenditures which the adoption of the recommendation would involve. This decision has been reached notwithstanding that the board, constituted as it was, has unanimously recommended, in effect at least, that in view of the substantial increases in rates of pay and improvement in working conditions that the employees have received in recent years, employees now receiving rates of pay of 40 cents an hour or over should not under existing conditions receive any further increase. It was definitely shown in evidence submitted to the board, which was not questioned, that rates of pay in recent years had increased materially beyond any increase in the cost of living and that there has not been any change in the cost of living since the rates of pay for maintenance of way employees were last revised to justify any further revision upwards at the present time."

Foreign Railway News

Railway Investigation Ordered in Spain

An official investigation, under the direction of the Minister of Public Works, of the financial and technical condition of all the Spanish railways enjoying subsidies from the government has been authorized by royal decree, according to Commercial Attaché Cunningham at Madrid. The decree provides for the organization of commissions, consisting of engineers and properly accredited auditors, who will examine the accounts of the railroads now under concessions from the government and will render a report on the economic situation of each, with special reference to the aid it is receiving from the state. Special attention for 1913, 1919, 1922, and 1923 is to be devoted to gross earnings, gross operating expenses, costs incurred by boards of directors, interest on bonds and debts, costs of financial management and dividends and the cost of their distribution.

Such investigations are authorized by laws which have been in effect for 50 years, but no suggestions have been made for their execution, according to the decree. Special concessions were made by the government as a war measure, large sums having been advanced without determining accurately the needs of the railroads. It is suggested that the annual reports of the railroads may not show exactly their true financial condition. It is stated that the military directorate has in preparation a new plan of operation and control and that the investigation, having largely to do with the finances and accounts of the railroads, will give to the directorate a thorough understanding of the economic situation of the roads, which is indispensable for the proper execution of this plan.

Wide Variety of Railway Courses Offered by London School

The London School of Economics, which is without doubt one of the best institutions of its character in the world, is offering a great many courses in transportation which are given at various hours from five to seven in the evening for the convenience of railway officers and employees.

The list of courses given is published here as being probably the most comprehensive and thorough training in their work offered to railway men in the world. This list, taken from Modern Transport (London), follows:

THE LAW OF CARRIAGE BY RAILWAY, 20 lectures. The carriage of goods.—The rights and liabilities of the common carrier. The Carriers' Act. The Railway and Canal Traffic Act, 1854. Special contracts of carriage. Owner's risk notes. The ordinary conditions of a consignment note. Stoppage *in transitu*. Through traffic. Rights and liabilities after completion of transit. Rates. Recovery of charges. Animals. Passenger's luggage. Reasonable facilities. Undue preference. The carriage of persons.—Responsibility for the safety of passengers and others. Negligence and contributory negligence. The contract with the passenger. The ticket and the time-table. Through tickets. By-laws and offences.

RAILWAY STATISTICS, 10 lectures. Distinction between statistics of the railway system and purely local statistics. Requirements of the Ministry of Transport. Tons carried; ton-miles; wagon-miles; train-miles; engine-miles and their derivatives. Similar passenger units. The statistics of the published annual reports; construction and maintenance, operating. Statistics of the goods warehouse; the station-yard; the marshalling-yard; the passenger station; the signal-box.

COMMERCIAL RAILWAY ECONOMICS, 20 lectures. Organization. Capital and expenditure. Gross and net receipts. Analysis of a railway report. Growth and passenger traffic. Passenger fares. Season tickets. Workmen's tickets. Excursion tickets. Goods rates. Theory of railway rates. Rate making in practice. Maximum rates and charges. Special rates. Discrimination. Classification of goods. Railway Clearing House. State control of rates. Competition. Traffic pools. State ownership of railways. State guarantees. State control without financial responsibility.

OPERATING RAILWAY ECONOMICS, 20 lectures. Organization. Train working—including timing trains, arrangement of guards' and enginemen's turns, loads, train control, supervision of actual running. Signaling—The history and general principles of signaling. Single and double line working. Station, yard and warehouse operating—Principles of design. Methods of working and tests of efficiency. Rolling stock—Relation of tareweight and capacity. Value of interchangeability. Systems of distribution. Staff—Grading. Hours. Wages, including bonus systems of payment. Supervision.

HISTORY OF RAILWAYS, 10 lectures. Early stages in railway development. Internal problems such as the provision of capital, the relation of independent railway systems to each other, amalgamations and the Clearing House. External problems such as the relation of railways to the state and to other branches of transport, *e.g.*, shipping, expansion of railways in the chief continental countries, the United States and the great food-producing countries.

GENERAL ECONOMICS, with special reference to transport, 10 lectures. Subject matter of Economics; Methods of Economics; Application to Railways and Shipping; The Demand for Commodities and Services—Law of Diminishing Utility; Indivdual and Market Demands; Elasticity of Demand with special reference to Transport services; Joint character of an Individual's Demands. Agents of Production—Land, Labor, Capital, Organizing Power. Law of Decreasing Returns—Application to Labor; Application to a railway undertaking when the capacity of a line is reached. Overcrowding and congestion. Law of Increasing Returns—Economics of large scale production; Growth in density of traffic; Development of subsidiary industries, *e.g.*, docks, hotels, etc., owned by railway company; Limitations to the Law; Joint Products. Industrial Combinations—Causes of railway combinations; Types of permanent combinations; Types of temporary combinations; Associations to further common interests, *e.g.*, Railway Clearing House and railway conferences; Effects of railway combinations on companies outside the combinations and on the general public; Shipping rings. Determination of Prices—Under competitive and monopoly conditions; Definition of value; Market-price; long-period and short-period prices, *e.g.*, Class rates and special rates for particular contracts; Uniform and differential charges as exemplified by railway rates; Cost of supplying railway services as a factor influencing their prices; Demand for railway services as a factor influencing their prices.

RAILWAY FINANCE AND THE STATE, 10 lectures. Financial relations between the state and the railway companies. A sketch of the gradual assumption by the state of control over the chief items in railway operating expenses. The present position reviewed in the light of recent legislation. The determination of railway rates and state control over sources of railway revenue. Effects of recent measures on the financial prospects of British railways.

AMERICAN RAILWAYS, 10 lectures. General outline of American railway history, Growth and development of railway system. State control and federal regulation. Establishment of Interstate Commerce Commission. Growth of influence of I.C.C. and its regulation of rates and charges. The "Long and short haul" Clause. "Determination" in America. Trans-continental rates. The opening of the Panama Canal and its effect on American Traffic rates. The basis of cost of service. Tariffs, scales and classification. The Transportation Act of 1920. Grouping and consolidation of U.S.A. railway systems.

CONTROL SYSTEMS IN RAILWAY WORKING, 10 lectures. The meaning of train control in passenger and goods train operating. Description of control apparatus. Short history of development and extension. Signalman's control; the block system. Single line working, interlocking, etc. The yard-master. The trainmaster. The district manager or superintendent. The general superintendent's trains office. Central control by telephones. Control of locomotive power; the rolling-stock controller; the control of town cartage. Statistical control.

PROBLEMS OF RAILWAY GOODS TRAFFIC, 10 lectures. The securing of traffic: advertising, canvassing, the commercial agent. The collection and delivery of traffic; cartage problems. The forwarding and delivery of traffic; consignment notes, invoicing, sorting and loading. The conveyance of goods traffic; varying description of trains, marshalling, transhipping, etc. Station services and equipment; arrangements for handling and loading. The charging of goods traffic; rates and classification. Goods rolling-stock; types of wagon for varying classes of traffic; standardization. Special descriptions of traffic; live stock; dock traffic. Goods department organization; the goods agent. The Railway Clearing House and its functions.

PROBLEMS OF RAILWAY PASSENGER TRAFFIC, 10 lectures. The passenger station and its staff. Passenger fares and charges; Season and special tickets; Urban, suburban and interurban services. The importance (1) of punctuality, (2) of comfort, (3) of speed. Problems of passenger rolling stock. The passenger time-table and the working time-table. The conveyance of "parcels" traffic. Problems of signalling and safe working. Advantages of electric traction. Statistics. Organization of the passenger department.

THE NEW ERA IN RAILWAY TRANSPORTATION, 20 lectures. Is there a new era? Consider parallel on conclusion of Napoleonic Wars a century ago. Birth of railways leading to industrial era of nineteenth century. Arrest of railway development during recent great war and breakdown in many countries followed by reorganization and reconstruction. Consolidation of railway systems in all countries as effect of separation by distance is being gradually eliminated. The era of unlimited competition is giving place to an era of co-operation and co-ordination. Direct effects of war. Increase of financial dependence upon state with government guarantees in various directions. Versailles treaty and provisions affecting railways. Growth of democratic control in industry. Railway labor boards and wages councils. Rapid growth of scientific methods such as automatic mechanical working, electric power for traction and many minor directions. Telephonic control in train working. Effect of above developments on (1) character of personnel, (2) financial economy and efficiency generally, (3) methods of railway management. In light of foregoing, examine carefully the provisions of (a) Transportation Act 1920, U.S.A., (b) Railways Act 1921, Great Britain, (c) New constitution for Railways of Germany, (d) the French Railway Act of 1921. Increasing control in management by workers' representatives in various countries—U.S.A., Great Britain, Germany, France.

RAILWAY ACCOUNTS, 10 lectures. Modern methods of accounting. Stores accounts. The principles of cost accounts. Bankruptcy and insolvency accounts. The linking up of station accounts and railway accounts. The Railway Clearing House. Published accounts of railways and their interpretation. The audit. Capital reorganization.

RAILWAY AND COMMERCIAL GEOGRAPHY, 20 lectures.

ORGANIZATION OF TRANSPORT, 26 lectures. Organization of railways. Relation to the state. Ownership or control—the charter—state requirements for construction and operation—Limitation of charges. Relations to one another—limitation of competition—charges—services—agreements to give more effective service and to utilize equipment better. Internal administrative and executive organization. Railway development within the Empire—Problem of Gage—standardization of equipment and rolling-stock. Organization of

road transport. Organization of Inland Water Transport. Organization of Sea Transport.

ECONOMICS OF TRANSPORT, 26 lectures. Railway transport. Capital and expenditure. Gross and net receipts. Economics of railway construction and maintenance. Growth of passenger traffic. Passenger fares. Influence on distribution of population. Freight rates and their theory. Rate-making in practice. Influence of production costs on rates. Classification in goods. Special rates. Discrimination. Control of rates by maxima, by commissions, by state departments. Competition. Traffic pools. Effects on rates and fares of state ownership, and state guarantees of interest. Influence of railway rates on the distribution of industries. Inland water transport. Sea transport.

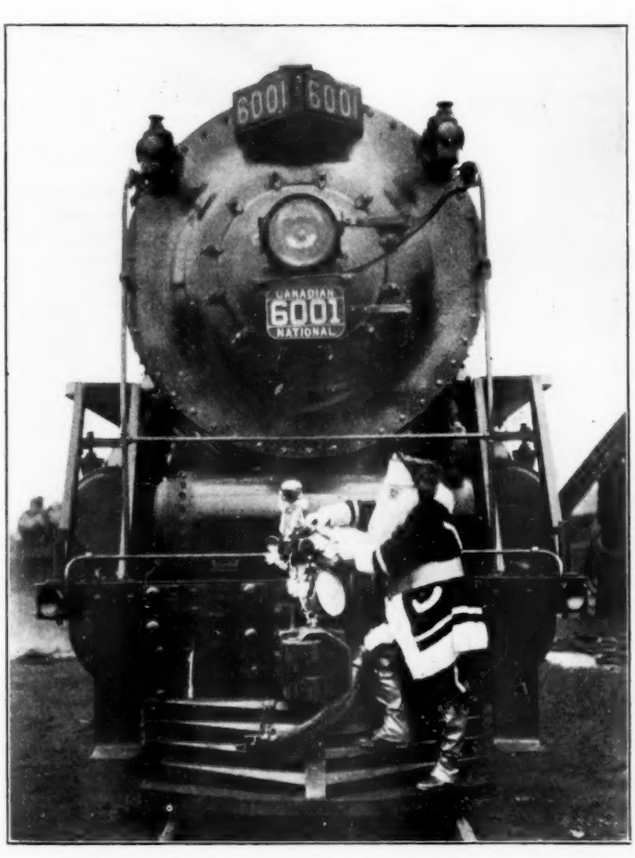
Railway Consolidation in Cuba

Three Cuban railways, the Cuba Railroad, the Camaguey & Nuevitas and the Cuba Northern—total mileage 905—are planning amalgamation by an exchange of securities on the basis of earning capacity. The United Railways of Havana owned by English capital, have not yet been able to agree to terms which would include them in the consolidation, which is provided for in the much discussed Tarafa law, recently passed by the Cuban Congress.

President A. H. Smith, of the New York Central, has been appointed a member of the voting trust set up as the first step in the consolidation of the Cuban railways. Other members are H. S. Rubens, president of the United States Industrial Alcohol Company; H. C. Lakin, president of the Cuba Company, which controls the Cuba Railroad; J. M. Tarafa, president of the Cuba Northern, and Guy W. Currier, of Boston.

Under the plan the trustees have the power to proceed with consolidation whenever it seems expedient and whenever the depositing stockholders agree as to the necessary financing and other terms of the consolidation. Meanwhile the voting trust provides a unified control for the operation of the properties, the Cuba Railroad, Camaguey & Nuevitas and the Cuba Northern.

All of the common stock of the Cuba Railroad, two-thirds of the common and all of the preferred stock of the Cuba Northern and all the stock of the Camaguey & Nuevitas will be deposited under the voting trust and deposit agreements.



Preparing for Christmas on the Canadian National

Equipment and Supplies

Locomotives

THE CANADIAN NATIONAL is inquiring for about 5, 2-10-2 type locomotives.

THE SOUTH MANCHURIAN RAILWAY has ordered 5 Mikado type locomotives from the American Locomotive Company.

Freight Cars

THE SEABOARD AIR LINE is inquiring for 932 flat car bodies.

THE WESTERN FRUIT EXPRESS is inquiring for 1,000 refrigerator cars.

THE LEHIGH & HUDSON RIVER is inquiring for 10 refrigerator cars.

THE ANGLO-MEXICAN PETROLEUM COMPANY is inquiring for 28 tank cars.

THE SOUTHERN PACIFIC opened bids on December 19 for 6,500 freight cars.

THE AMERICAN STEEL & WIRE CO. is inquiring for 20 steel gondola cars.

THE NORTHERN PACIFIC is inquiring for 200 ore cars of 70 tons' capacity.

THE SWIFT CAR LINES are inquiring for 300 steel underframes for refrigerator cars.

THE BANGOR & AROOSTOOK is inquiring for 75 steel underframes and side constructions.

THE PACIFIC FRUIT EXPRESS will open bids for 3,057 refrigerator cars on December 26.

THE FRUIT GROWERS EXPRESS is inquiring for 1,000 steel underframes for refrigerator cars.

THE PHILADELPHIA & READING, reported in the *Railway Age* of November 3 as inquiring for 20 caboose cars, will build these cars in its own shops.

THE CHESAPEAKE & OHIO, reported in the *Railway Age* of November 10 as inquiring for 2,000 gondola cars, has decided not to buy this equipment.

THE CHICAGO & ALTON, reported in the *Railway Age* of November 10 as inquiring for 250 box cars, has ordered this equipment from the Pullman Company.

THE ST. LOUIS SOUTHWESTERN, reported in the *Railway Age* of November 24 as inquiring for 1,000 box cars of 40 tons' capacity, has divided an order for these cars equally between the American Car & Foundry Co., and the Mount Vernon Car & Manufacturing Co.

THE NORFOLK & WESTERN, reported in the *Railway Age* of December 1 as asking for prices on the rebuilding of 1,000, 57½-ton hopper cars, has divided equally the contract for rebuilding these cars between the Newport News Shipbuilding & Dry Dock Co., and the Ralston Steel Car Company.

THE NEW YORK CENTRAL, reported in the *Railway Age* of December 1 as asking for prices on the conversion of a number of cars, has let orders for converting 400 box cars to single deck stock cars to the Standard Tank Car Company; for converting 500 gondola cars to flat cars to the Youngstown Steel Car Company; and for converting 500 gondola cars to flat cars to the Pennsylvania Tank Car Company. The conversion of about 600 cars to double deck stock cars will be arranged later.

Passenger Cars

THE MISSOURI PACIFIC is inquiring for 3 gasoline motor coaches.

THE VIRGINIA & CAROLINA SOUTHERN has ordered a gasoline passenger motor car from the Edwards Railway Motor Car Company.

THE ALABAMA & VICKSBURG has ordered 5 coaches, 2 combination passenger and baggage cars and 1 baggage car from the American Car & Foundry Co.

THE INTERSTATE PUBLIC SERVICE COMPANY, Indianapolis, Ind., has ordered 2 motor express cars and 3 express trailer cars from the American Car & Foundry Co.

THE LEHIGH VALLEY, reported in the *Railway Age* of November 3 as inquiring for 25 milk cars, has placed an order for this equipment with the American Car & Foundry Co.

THE CENTRAL OF GEORGIA, reported in the *Railway Age* of December 15 as inquiring for 2 partition coaches and 4 straight coaches, is now inquiring for 4 end partition and 2 middle partition smoking cars, 4 postal and baggage cars, 3 baggage and express cars and 2 baggage and passenger cars.

THE INTERBOROUGH RAPID TRANSIT COMPANY, reported in the *Railway Age* of October 20 as inquiring for 100 steel motor cars for its subways, has ordered the bodies and trucks for these cars from the American Car & Foundry Co., and the electrical equipment from the General Electric Company.

Iron and Steel

THE NEW YORK, CHICAGO & ST. LOUIS is inquiring for 10,000 tons of rail.

THE ATCHISON, TOPEKA & SANTA FE, reported in the *Railway Age* of December 15 as being in the market for 100,000 tons of rail and 25,000 tons of angle bars, tie plates, spikes and bolts, has ordered 70,000 tons of rail from the Colorado Fuel & Iron Co., 17,850 tons from the Illinois Steel Company, 10,319 tons from the Inland Steel Company and 4,300 tons from the Bethlehem Steel Corporation. The order for track supplies was divided proportionately among the four companies.

Machinery and Tools

THE SOUTHERN RAILWAY is inquiring for one double head axle lathe, two car-wheel truing lathes, one 18-in. tool room lathe, four 16-in. lathes, one 20-in. by 12-ft. engine lathe, two 36-in. engine lathes, one 24-in. heavy duty lathe and two 48-in. punches.

Miscellaneous

THE NEW YORK CENTRAL has ordered 4,500 kegs of spikes and a quantity of splice bars from the Inland Steel Company.

THE NEW YORK CENTRAL will receive bids until 12 o'clock noon, December 27, for its requirements until April 1, 1924, for the Lines East and West of Buffalo, of fuel oil, gasoline, kerosene, long time burning semaphore oil, turpentine substitute, coach candles, mineral seal oil, common black oil, West Virginia black oil, gas oil and lubricating oils.

THE NORFOLK & WESTERN will receive bids until 12 o'clock noon, December 26, at Roanoke, Va., for its requirements of a maximum of 2,000 tons of steel bars, shapes and plates for shipment during the first quarter of 1924; also for its requirements from January 1, to March 31, 1924, of brake shoes; steel springs; locomotive steel tires; wire fencing and couplers and parts.

THE TRAFFIC CLUB of New England, at its annual meeting in Boston on December 11, elected as president for the ensuing year A. P. Russell, vice-president of the New York, New Haven & Hartford; vice-presidents, A. E. Allen, Charles H. Conant, John P. Hach and Sidney J. Jackson; secretary, P. L. Stuart.

Supply Trade News

J. G. Aye, general foreman at Fresno, Cal., on the Southern Pacific, has been appointed a service engineer of the **Franklin Railway Supply Company, Inc.**, New York.

The Stewart Manufacturing Corporation, Chicago, has taken over the properties of the **Jerome-Edwards Metallic Packing Company**, Chicago, and **George C. Jerome**, president of the Jerome-Edwards Metallic Packing Company, has been appointed manager of the railroad department of the Stewart Manufacturing Company, with headquarters at Chicago. He was born on November 10, 1865, at Port Huron, Mich., and entered the metallic packing business in 1884 with the C. C. Jerome Company, which was organized by his father. He held numerous positions in the plant and was travelling representative for the company when he took over the control of the business. In 1903 he organized the Jerome & Elliott Company at Chicago and in 1913 purchased the interest of Mr. Elliott and organized the Jerome-Edwards Metallic Packing Company at Chicago.

G. C. Jerome

L. G. Plant has been appointed assistant to the president of the **National Boiler Washing Company**, Railway Exchange building, Chicago. Mr. Plant was born at Minneapolis, Minn., in 1885 and was first employed by the Baldwin Locomotive Works as a special apprentice and as a boiler maker's apprentice on the Southern Railway. He studied at the University of Virginia and at Stevens Institute of Technology from which he received the degree of mechanical engineer in 1909. He then entered the employ of the Southern Pacific lines as a student of operation. Later he was employed as a mechanical engineer on a subsidiary of the Southern Pacific in charge of equipping the railroad for the use of fuel oil and in 1913 was appointed superintendent of fuel service for the Southern Pacific Lines in Texas and Louisiana. In 1914 he was appointed fuel engineer on the Seaboard Air Line, which position he held until 1918. Shortly after the Division of Finance and Purchases of the Railroad Administration was organized at Washington, he was made progress engineer and chief clerk to the manager of the procurement section. In March, 1920, Mr. Plant joined the staff of the *Railway Age* as an associate editor and a year later he went to the Railway Review in the same capacity. On December 30, 1922, he was appointed to the position of

L. G. Plant

editor of the Railway Review. Mr. Plant has given particular attention to locomotive fuel and terminal problems and is the author of a number of articles and papers on these subjects.

J. **Lawrence Gilson** has been appointed New York manager of **Day & Zimmermann, Inc.**, Philadelphia, Pa. Mr. Gilson's headquarters are at 2 Wall street, New York City.

The Sherwin Williams Company held a convention and exhibit of paints at the Congress Hotel, Chicago, December 17 to 20, which was attended by salesmen and others interested in paints.

Hendricks Commercial Register, New York, heretofore owned by the Kelly Publishing Company of London, England, will be taken over on January 1, 1924, by **MacRae's Blue Book Company**, of Chicago. There will be no consolidation of the two books and both will be continued in their present form.

Charles E. Lee, formerly general superintendent of the Boston & Maine, who has for several years been making special transportation studies and reports for various interests in different sections, has established headquarters at 30 Church street, New York City. Associated with Mr. Lee are **C. H. Garber**, consulting railroad engineer of Omaha, a specialist in valuation, construction and maintenance reports, and **James R. Hendry**, an expert in motor truck transportation.

Obituary

Thomas Evans, president of the Macbeth-Evans Glass Company, Pittsburgh, Pa., died December 8 at Pittsburgh.

Trade Publications

COLD REPAIR CEMENT.—A small size, 16-page, illustrated booklet has been issued by the Barber Asphalt Company, Philadelphia, Pa., containing specifications for the construction of railroad grade crossings and station platforms by means of a cold repair cement manufactured by this company. The text matter of the booklet gives the various requirements for the construction of new crossings and the repairing of old, as well as the detailed procedure to be followed in carrying out this work.

WATERPROOF PAINT.—Under the title of "75 Years," Toch Brothers, New York City, have recently issued a large size, 12-page, illustrated booklet as a souvenir of their seventy-fifth birthday in the manufacturing of R. I. W. preservative paints and compounds. The first part of the text describes briefly the founding of Toch Brothers. This is followed by a partial list of well known structures protected by this company's products, as well as some of the principal accomplishments which have been achieved by them.

WROUGHT PIPE.—The National Tube Company, Pittsburgh, Pa., has recently issued a small size, 16-page, illustrated booklet descriptive of the remarkable tests to which the pipe manufactured by this company had been submitted through accident. The booklet, which has been given the title, "The Seven Wonders of Wrought Pipe," describes in detail such incidents as the blowing out of over 3,000 ft. of 3-in. drill pipe from an oil well with the result that although the pipe coiled and twisted all over the surrounding area, no joints were broken. The other incidents are of a somewhat similar nature. The condition of the pipe is shown in the illustrations.

STAINLESS STEEL.—The Firth Stainless Steel Company, Keysport, Pa., has recently issued a 62-page, illustrated book descriptive of the purpose and application of the stainless steel and iron. All the various applications of stainless steel are listed, as well as a detailed description of the methods of forging, annealing, hardening, and tempering of stainless steel and stainless iron. The various physical properties of this material are also given in detail so that any form of calculation for the use of it can be readily carried out. The illustrations show a number of its practical uses such as, for instance, machine tools, ball bearings, steel plates, electrical appliances, engine and compressor fixtures, etc.

Railway Construction

COLORADO, COLUMBUS & MEXICAN.—The Interstate Commerce Commission has denied this company's application for a certificate for the construction of 550 miles of electric railroad to be connected with about 1,200 miles of line to be constructed in Mexico and extending from a point on the international boundary near Columbus, N. M., to Farmington, N. M., with various branches. The commission finds that the company has greatly underestimated the probable expenses and overestimated the traffic and revenues; that the project has not been well studied; that the engineering conditions are not sufficiently known; that the construction cost has been much underestimated; that the line would have no considerable value as a through route, and that it would not have enough traffic to justify its construction in whole or in part.

COLORADO & SOUTHERN.—This company will construct extensions from Wellington, Colo., into adjacent oil fields and will construct a warehouse at the end of its new line.

DETROIT & IRONTON.—This company has applied to the Interstate Commerce Commission for a certificate authorizing the construction of a new line from Wauseon, O., to Durban, Mich., 43 miles, in order to afford a shorter and better line than that now operated by the Detroit, Toledo & Ironton, which consists partly of trackage rights. The company also asks authority to issue first mortgage gold bonds from time to time as may be necessary to pay the cost of construction.

LOUISVILLE & NASHVILLE.—This company is reported to have awarded contracts to the Brooks Calloway Company, Atlanta, Ga., the Codell Construction Company and the Boxley Brothers Company, of Orange, Virginia, for the construction of a second track from Fort Esdill, Kentucky, to Conway.

SOUTH MANCHURIAN RAILWAY.—This company has awarded a contract to the Roberts & Shaefer Company, Chicago, for the construction of a 300-ton reinforced concrete locomotive coaling station on the company's line in Manchuria.

SOUTHERN PACIFIC.—This company closed bids on December 21 for the construction of the third section of its Natron cutoff between Eugene, Ore., and Klamath Falls, reported in the *Railway Age* of November 17. This company is reported to be planning the construction of second track from Burbank, Cal., to Saugus, a distance of 20 miles.

STALEY SYSTEM OF ELECTRIFIED RAILWAY.—The Interstate Commerce Commission has denied the application for a certificate authorizing the construction of a line of railroad proposed to include about 1,307 miles from a point on the Gulf of California in Mexico through Mexico, southeastern Arizona, northwestern New Mexico, and southwestern Colorado to a point on the Colorado-Utah boundary, with various branches. The Commission says that public convenience and necessity have not been shown to require the construction of such a line. The estimates of prospective revenues are regarded as excessive and the estimates of operating expenses as much too low. Considering the line as a whole, the applicant has over-estimated its traffic possibilities.

VIRGINIAN.—The Interstate Commerce Commission has issued a certificate authorizing the construction of an extension of the Guyandot river branch, 1.19 miles, to the line of the Pocahontas Fuel Company. The commission has reversed its previous decision on this in which the application was denied.

AT A MEETING of the Great Lakes Shippers' Advisory Board on December 11, at Cleveland, Ohio, 15 commodity committee chairmen presented estimates showing that freight movement in the Great Lakes District during the first two months in 1924 will be equal to that during the average 60-day period of the current year. The railroads were advised to prepare to handle large movements of freight from all main production lines centered around the Great Lakes.

Railway Financial News

APACHE RAILWAY.—*Sold to El Paso Interests.*—The Apache Railway, a standard gage lumber road 73 miles long, from Cooley, Ariz., to Holbrook, was included in the sale of the Apache Lumber Company to a group of El Paso business men. The purchasers of the property include James G. McNary, president of the First National Bank of El Paso, Tex.; W. M. Cady; B. E. Smith and others.

BALTIMORE & OHIO.—*Equipment Trust Certificates Authorized.*—The Interstate Commerce Commission has authorized this company to assume obligation and liability in respect of $7,000,000 of equipment trust certificates to be issued by the Girard Trust Company and sold at not less than 95.

Dividends.—The directors have declared quarterly dividends of 1 per cent on the preferred and 1¼ per cent on the common stocks, payable March 1, 1924, to stockholders of record, January 12, 1924.

Income Statement.—The income statement for the year to December 31, 1923 (December estimated) shows:

Net railway operating income		$43,319,434
Other income		6,026,152
Gross corporate income		$49,345,586
Deductions for interest, rentals, etc		26,104,417
Net corporate income		$23,241,169
Appropriation of income necessary to satisfy in full the provisions of the loan agreements of July 1, 1919	$5,250,000	
Amount required for 4 per cent dividend on preferred stock	2,354,527	$7,604,527
Remainder		$15,636,642

From the surplus there have been declared dividends on the common stock of 1¼ per cent each paid December 1, 1923, and payable March 1, 1924.

BOSTON & MAINE.—*Bond Issue Authorized.*—The Interstate Commerce Commission has authorized an issue of $7,000,000 of 6 per cent mortgage bonds to be deposited with the Secretary of the Treasury as collateral for a loan.

CHICAGO, ROCK ISLAND & PACIFIC.—*Asks Authority for Lease.*—This company has applied to the Interstate Commerce Commission for authority to acquire control by lease of the Keokuk & Des Moines.

DENVER & RIO GRANDE WESTERN.—*Reorganization Plan Approved.*—The Interstate Commerce Commission has issued an order providing with certain terms and conditions the plan of reorganization which provides for the acquisition by the Denver & Rio Grande Western of stock of the Rio Grande Junction and of the Rio Grande & Southwestern, and the issue of $29,808,000 of general mortgage bonds, $16,445,600 of 6 per cent cumulative preferred stock and the assumption of obligation and liability in respect of securities amounting to $85,612,000.

KANSAS CITY NORTHWESTERN.—*Terminal Sold.*—The Missouri Pacific has purchased the land and terminal buildings of the Kansas City Northwestern in Kansas City, Kan., for $1,200,000. The Kansas City Northwestern, which extends from Kansas City, Kan., to Virginia City, Neb., has not been in operation since December 1, 1919. Only the Kansas City Terminal is included in the purchase. Officers of the road have stated that the contract will not prevent the rehabilitation of the Northwestern; on the contrary, it will probably hasten it. The Missouri Pacific has for some time used approximately 1½ miles of the Northwestern's tracks in Kansas City, under a lease.

LAKE SUPERIOR & ISHPEMING.—*Asks Authority to Issue Stock.*—This company has applied to the Interstate Commerce Commission for authority to issue stock for the purpose of affecting a consolidation of the Munising, Marquette & Southeastern. It is proposed to issue $1,000,000 of new stock to the present stockholders in exchange for their stock and $428,000 to the stockholders of the other road in exchange for their stock.

LEHIGH VALLEY.—*Asks Authority to Continue Control.*—This company has applied to the Interstate Commerce Commission for authority to continue in a lawful manner control of the Delaware, Susquehanna & Schuylkill by lease and ownership of stock. The Supreme Court in its decision in the anti-trust case held that the existing control is prohibited by the anti-trust law.

MISSOURI PACIFIC.—*Buys Terminal.*—See Kansas City Northwestern.

MUNISING, MARQUETTE & SOUTHEASTERN.—*Consolidation.*—See Lake Superior & Ishpeming.

NEW YORK CENTRAL.—*Asks Authority to Increase Stock.*—The Interstate Commerce Commission has been asked to authorize an issue of $31,510,620 of increased capital stock to be offered to the stockholders at par to the extent of 10 per cent of their present holdings.

TORONTO, HAMILTON & BUFFALO.—*New Director.*—Anthony D. McTier has been elected a director to succeed Lord Shaughnessy, deceased.

Treasury Payments to Railroads

Payments to railroads under the Transportation Act up to the end of November amounted to $893,984,588.76, according to the monthly statement issued by the Treasury Department. A total of $147,862,592.41 has been repaid on loans made from the $300,000,000 revolving fund. Total payments on account of reimbursement of deficits amounted to $8,290,133.55; on account of the guaranty, $501,818,306.03; and on account of loans, $339,800,667. Payments made in November were reported as follows:

Section 204:	
Alabama Central	$9,136.52
Bay Terminal Railroad	7,499.00
Mineral Point & Northern	12,222.92
Penn Yan & Lake Shore Receiver	2,204.23
Thornton & Alexandria	10,056.00
Section 209:	
Evansville & Indianapolis	228,594.35
Glenmora & Western	391.84
Kane & Elk	1,532.22
Long Island	1,178,990.54
Midland Railway, Receiver	4,724.00
Monson Railroad	268.58
Morenci Southern	19,380.92
Penn Yan & Lake Shore, Receiver	1,631.66
Randolph & Cumberland, Receiver	2,788.09
Section 210:	
Seaboard Air Line	350,000.00
Total	$1,829,420.87

Dividends Declared

Albany & Susquehanna.—2 per cent, (special), payable January 5 to holders of record December 22.

Allegheny & Western.—$3.00, semi-annually, payable January 1 to holders of record December 26.

Canada Southern.—1½ per cent, semi-annually, payable February 1 to holders of record December 28.

Chicago, Indianapolis & Louisville.—Common, 1¾ per cent, semi-annually; preferred, 2 per cent, semi-annually; both payable January 16 to holders of record December 29.

Cleveland, Cincinnati, Chicago & St. Louis.—Common, 1 per cent, quarterly; preferred, 1¼ per cent, quarterly; both payable January 19 to holders of record December 28.

Detroit River Tunnel.—3 per cent, semi-annually, payable January 15 to holders of record January 8.

El Paso & Southwestern.—1¾ per cent, quarterly, payable January 2 to holders of record December 20.

Great Northern.—Preferred, 2½ per cent, semi-annually, payable February 1 to holders of record December 27.

Kansas City Southern.—Preferred, 1 per cent, quarterly, payable January 15 to holders of record December 31.

Little Schuylkill Nav. R. R. & Coal.—$1.00, payable January 15 to holders of record December 18.

Mahoning Coal Railroad.—Common, $10, payable December 28 to holders of record December 21; preferred, $1.25, payable January 2 to holders of record December 21.

Michigan Central.—Common, 10 per cent, payable January 29 to holders of record December 28.

Mobile & Ohio.—3½ per cent, payable December 29 to holders of record December 17.

New York Central.—1¾ per cent, quarterly, payable February 1 to holders of record January 2.

Philadelphia & Western.—Preferred, 1¼ per cent, quarterly, payable January 15 to holders of record December 31.

Old Colony.—$1.75, quarterly, payable January 1 to holders of record December 15.

Pittsburgh & Lake Erie.—$2.50, semi-annually, payable February 1 to holders of record January 11.

Virginian.—Common, (initial), 4 per cent, payable December 31 to holders of record December 20.

Trend of Railway Stock and Bond Prices

	Dec. 18	Last Week	Last Year
Average price of 20 representative railway stocks	59.01	60.15	63.83
Average price of 20 representative railway bonds	82.43	82.83	85.10

Railway Officers

Executive

Robert E. M. Cowie, heretofore vice-president of the eastern departments of the American Railway Express Company, has been elected president with headquarters in New York City, succeeding George C. Taylor, deceased. **F. P. Small** has succeeded Mr. Taylor as president of the American Express Company, which company continues to do its tourist and exchange business independently of the American Railway Express.

H. T. Evans, controller of the Chicago, Indianapolis & Louisville with headquarters at Chicago, has been elected vice-president and controller with the same headquarters, a newly created position. **E. P. Vernia,** general freight agent with headquarters at Chicago, has been elected vice-president in charge of traffic with the same headquarters, succeeding Fred Zimmerman, whose election as president of the Cincinnati, Indianapolis & Western was reported in the *Railway Age* of November 10.

Financial, Legal and Accounting

Frank A. Walsh has been appointed assistant controller of the Maine Central with headquarters at Portland, Me.

Operating

B. L. Thompson has been appointed assistant superintendent of terminals at Norfolk, Va., for the Norfolk & Western, succeeding C. P. Taylor, who has been appointed chief electrical engineer.

F. G. Faulkner, superintendent of the River division of the St. Louis-San Francisco, with headquarters at Chaffee, Mo., has been promoted to a position on the staff of the general manager and will have charge of special matters. Mr. Faulkner has been succeeded by **J. A. Moran,** assistant division superintendent, with headquarters at Neodesha, Kans., as reported in the *Railway Age* of December 15. **E. E. Carter,** general agent at Tulsa, Okla., has been promoted to assistant division superintendent, with headquarters at Neodesha, Kans., succeeding Mr. Moran.

O. C. Hibbs, whose promotion to superintendent of the Chicago, Burlington & Quincy with headquarters at Brookfield, Mo., was announced in the *Railway Age* of December 15, page 1140, was born on July 30, 1882, at Fontanelle, Iowa, and entered railway service on June 1, 1899, as telegraph operator on the Chicago, Burlington & Quincy. He was subsequently promoted to agent and operator and in 1902, was promoted to chief clerk in the dispatcher's office at Ottumwa, Iowa. Mr. Hibbs was promoted to train dispatcher in 1905 and on September 1 of the following year, was promoted to night chief dispatcher. He was transferred to Galesburg, Ill., in October, 1912, and held this position until June, 1916, when he was promoted to train master, with the same headquarters. In December, 1917, he was promoted to assistant superintendent of the LaCrosse division, with headquarters at St. Paul, Minn. In September of that year, he was promoted to acting superintendent of the Brookfield division, with headquarters at Brookfield, Mo., which position he held until his recent appointment.

Hugh Wilson, whose appointment as superintendent of the Salida division of the Denver & Rio Grande Western, was reported in the *Railway Age* of December 15, was born on September 21, 1876, at Lincoln, Nebr. He was graduated from the University of Nebraska as a civil engineer in 1897 and entered railway service in April of that year as a section foreman on the Chicago, Burlington & Quincy. He was subsequently promoted to roadmaster and then to trainmaster, continuing in the latter capacity until 1905, when he was appointed assistant engineer on the Missouri Pacific. In 1906, Mr. Wilson was appointed assistant division superintendent on the Denver & Rio Grande Western and in 1909 he was appointed trainmaster and assistant superintendent on the Northwestern Pacific. For a time during 1913 he served as railroad service expert on the Railroad Commission of California, returning to the Northwestern Pacific as assistant to the president. He was appointed special engineer on the staff of the operating vice-president of the Baltimore & Ohio in 1914 and in 1916 was promoted to assistant division superintendent. After being promoted to division superintendent in 1918, he entered the service of the Chicago Great Western as a special representative of the federal manager in 1919. After the termination of federal control in 1920, he was appointed engineer maintenance of way. Mr. Wilson entered the service of the Denver & Rio Grande Western in 1920 as trainmaster, which position he held until August, 1923, when he was promoted to assistant division superintendent. In November, 1923, he was promoted to his present position of superintendent of the Salida division.

W. S. Butler, whose appointment as superintendent of the newly created division of the Chesapeake & Ohio with headquarters at Russell, Ky., was announced in the *Railway Age* of November 24, page 991, entered railway service on the Chesapeake & Ohio as a machinist at Clifton Forge, Va., in January, 1895. From 1896 to 1898 he was employed as a machinist on the Norfolk & Western, the Southern, the Florida Peninsular and the Atlantic Coast Line and in 1899 returned to the Chesapeake & Ohio in the same capacity at Huntington, W. Va. Later he was transferred to Handley, W. Va., and was promoted to roundhouse foreman and general foreman. In July, 1904, he was promoted to assistant master mechanic at Lexington, Ky., and in January, 1905, was transferred to the Hinton (W. Va.) division in the same capacity. In November of the same year, he was appointed assistant master mechanic of the Huntington shops with jurisdiction over all departments and was promoted to master mechanic in June, 1910. In October of the following year he was given jurisdiction over the entire Huntington division and in August, 1912, the Hinton division was also added to his jurisdiction with headquarters at Hinton. In January, 1913, Mr. Butler was appointed master mechanic of the Huntington, Logan, Big Sandy and Ashland divisions with headquarters at Huntington and on November 15, 1920, was promoted to assistant to general superintendent of the Western general division, which position he was holding at the time of his recent promotion.

W. S. Butler

Traffic

F. E. Staehle, soliciting freight agent for the Louisiana Railway & Navigation Company with headquarters at New Orleans, La., has been promoted to general eastern agent, with headquarters at New York, a newly created position.

W. R. Dale, general agent of the Great Northern, with headquarters at Victoria, B. C., has been promoted to import and export manager, with headquarters at Seattle, Wash., a newly created position. **A. H. Hebb** has been appointed general agent at Victoria, succeeding Mr. Dale.

W. C. McCormick, assistant general passenger agent of the Southern Pacific lines in Texas, with headquarters at El Paso, Tex., has been promoted to general passenger agent, with headquarters at Houston, Tex., succeeding Joseph Hellen,

transferred. **Edward McClanahan,** division passenger agent with headquarters at San Antonio, Tex., has been promoted to assistant general passenger agent with headquarters at El Paso, succeeding Mr. McCormick. **Thomas Hood** has been appointed division passenger agent with headquarters at San Antonio, succeeding Mr. McClanahan.

Engineering, Maintenance of Way and Signaling

S. L. Wonson, bridge engineer of the Missouri Pacific, with headquarters at St. Louis, Mo., has been promoted to assistant chief engineer, with the same headquarters, succeeding H. R. Carpenter, whose death on November 12 was reported in the *Railway Age* of November 17. **F. E. Bates,** assistant bridge engineer, with headquarters at St. Louis, has been promoted to bridge engineer, with the same headquarters, succeeding Mr. Wonson.

W. C. Mock, who has been appointed valuation engineer of the Oregon-Washington Railroad & Navigation Company, with headquarters at Portland, Ore., entered railway service in July, 1900, as a rodman on location and construction with the Northern Pacific. In September, 1902, he was promoted to assistant engineer in the maintenance of way department and in February, 1903, was appointed transitman on location. He was promoted to chief draftsman to the division engineer in April, 1904, and in June, 1906, was appointed chief draftsman and office assistant to the principal assistant engineer in charge of construction of the Northern Pacific and the Spokane, Portland & Seattle. Mr. Mock was promoted to resident engineer on the Spokane, Portland & Seattle in March, 1909, which position he held until February, 1914, when he was appointed field engineer in charge of dock construction for the Commission of Public Docks at Portland, Ore. In 1916, he was appointed assistant to the valuation engineer of the Oregon-Washington Railroad & Navigation Company and he continued in this capacity until his recent promotion to valuation engineer, succeeding **F. C. Squire,** who was appointed engineer, western group, of the Presidents' Conference Committee on Valuations, with headquarters at Chicago.

Mechanical

B. B. Milner, whose appointment as mechanical engineer of the Missouri-Kansas-Texas with headquarters at Parsons, Kans., was announced in the *Railway Age* of December 15, page 1140, was born on November 5, 1881, at Hartford, Kan. In 1899-1900 he worked in the Parsons shops of the Missouri-Kansas-Texas, and then entered Purdue University, from the mechanical engineering school of which institution he was graduated in 1904. Thereupon he entered the service of the Pennsylvania as a special apprentice at Altoona Works. He later worked in the test department and on special investigations. In 1908 he entered the office of the general manager at Philadelphia to engage in various betterment studies. In 1911 he was appointed assistant master mechanic of the company's subsidiary, the Philadelphia, Baltimore & Washington. In 1913 he was appointed special engineer on the staff of the senior vice-president of the New York Central. He was subsequently appointed engineer of motive power and during the regime of the Railroad Administration acted as chief mechanical engineer. At the termination of federal control he was appointed engineer of motive power and rolling stock. In 1920 he joined the staff of Sale & Frazer, Ltd., Tokyo, Japan, and later practiced in a private capacity as a consulting engineer in that city. Lately Mr. Milner has been practicing as a consulting engineer in New York.

B. B. Milner

C. P. Taylor has been appointed electrical engineer of the Norfolk & Western with headquarters at Roanoke, Va., succeeding **C. H. Quinn,** resigned.

Charles H. Quinn, chief electrical engineer of the Norfolk & Western, has resigned, effective December 15, 1923. Mr. Quinn was born in Sacramento, Cal., in 1874. His first railroad experience was gained on the Southern Pacific at San Antonio, Tex., where, in 1892, he entered the service as machinist's apprentice. Later, he completed his education at Purdue University, where he was graduated in 1899 as an electrical engineer. While going through school, Mr. Quinn put in two periods of three months each as journeyman machinist on the Mexican International and in the customs service of the government. After his graduation, he remained at Purdue University for two years as instructor in mechanical engineer drafting and shop practice. In 1901, he went to the Norfolk & Western as a draftsman. After a year in the service of this road, he was promoted to electrical foreman which position he held for five years. During this time he had the direct supervision of laying out plants, both steam and electric. While in this position, much of Mr. Quinn's work consisted of changing over steam plants into electric plants, including the terminal at Portsmouth, Ohio. In 1906, he was appointed assistant engineer of motive power. The work of investigation looking towards the electrification of the Norfolk & Western was begun in 1910 and electrification was authorized and installed in 1915. In 1914, Mr. Quinn was promoted to chief electrical engineer of the road which position he has held up to the time of his resignation.

C. H. Quinn

Purchasing and Stores

R. R. Jackson, district storekeeper on the Baltimore & Ohio, with headquarters at Cincinnati, Ohio, has been appointed district storekeeper on the Wabash, with headquarters at Decatur, Ill.

V. N. Dawson, division storekeeper of the Baltimore & Ohio Chicago terminal, has been transferred to Cincinnati, Ohio, succeeding R. R. Jackson, who has resigned to enter the service of another company.

V. R. Naylor, division storekeeper of the Tucson division of the Southern Pacific, with headquarters at Tucson, Ariz., has been transferred to the Sacramento division, with headquarters at Sacramento, Cal., succeeding A. E. Meahl, who has resigned. **H. P. Buchenery,** division storekeeper of the Stockton division, with headquarters at Tracy, Cal., has been transferred to the Tucson division, succeeding Mr. Naylor. **C. S. Jones,** assistant division storekeeper of the Salt Lake division, with headquarters at Sparks, Nev., has been promoted to division storekeeper of the Stockton division, succeeding Mr. Buchenery.

Obituary

H. L. Hobbs, formerly treasurer of the Colorado Midland, died at Denver, Colo., on December 7.

M. A. Patterson, general freight agent of the Chicago, Rock Island & Pacific with headquarters at Chicago, died in Los Angeles, Cal., on December 17.